

CULTURAL RESOURCES COORDINATION

May 13, 2013

SECTION 106: DETERMINATION OF ADVERSE EFFECT with MITIGATION

Nueces County, Corpus Christi District

Bridge Nos.: 16-178-0-0101-06-041, 16-178-0-0101-06-044, 16-178-0-0074-06-171,
16-178-0-0074-06-169, 16-178-0-0074-06-170, 16-178-0-0074-06-050, 16-178-0-0074-06-043

CSJ# 0101-06-095

US 181 @ Corpus Christi Ship Channel, US 181 @ Burleson Street, US 181 Northbound Ramp
@ US 181, US 181 Southbound Ramp @ Belden Street, US Southbound Off-Ramp @ SS 544,
US 181 Northbound at SS 544, US 181 Northbound On-Ramp @ SS 544

Ms. Kitty Henderson
Historic Bridge Foundation
Austin, Texas 78711

Dear Ms. Henderson:

The referenced undertaking will be carried out with federal funding. In accordance with the First Amended Programmatic Agreement Regarding the Implementation of Transportation Undertakings (PA-TU) between the Texas Department of Transportation (TxDOT,) the Federal Highway Administration (FHWA,) the Advisory Council for Historic Preservation (ACHP,) and the Texas State Historic Preservation Officer (TSHPO), this letter initiates Section 106 consultation (36 CFR 800.5) concerning the effects the proposed undertaking will have on a National Register eligible properties, the Corpus Christi Harbor bridge and a system of six additional associated post 45 bridges located within the project's area of potential effects (APE). We request your review and comment on the proposed undertaking.

Introduction

The Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT) propose to improve United States Highway (US) 181 at the Corpus Christi Ship Channel in the City of Corpus Christi, Nueces County, Texas, by removing and replacing the existing bridge structure. The existing bridge is commonly known as the Corpus Christi Harbor Bridge. The removal and replacement of the Corpus Christi Harbor Bridge would also require reconstruction and improvements to associated highways and nearby interchanges, including six additional bridges, in order to provide safe and efficient access to the new Harbor Bridge.

The existing Harbor Bridge would be replaced by a six-lane divided structure with shoulders, constructed on a new-location alignment. Several alternatives are currently under consideration

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for the exact alignment of the replacement bridge and its approaches. While the design of the replacement structure has not been determined, cost analyses conducted for the project have assumed that the bridge would be a cable-stayed structure with concrete tower piers, based on the clear span and vertical clearance requirements at the crossing. The cable-stayed design would also provide an opportunity to design a "signature" bridge for the Corpus Christi waterfront and downtown areas.

The proposed project is captioned as TxDOT Control-Section-Job (CSJ) 0101-06-095. The project is included in the Corpus Christi Metropolitan Planning Organization's Metropolitan Transportation Plan (MTP) 2010-2035 and is listed in TxDOT's 2013 Unified Transportation Program (UTP). With an anticipated construction letting date of 2017, the project would be undertaken beyond the current 2013-2016 Statewide Transportation Improvement Program (STIP) planning period.

Below is a list of structures included in the project, including associated information in the TxDOT Bridge Inspection Database and National Register of Historic Places (NRHP) eligibility status:

1. Existing Corpus Christi Harbor Bridge, US 181 over the Corpus Christi Ship Channel, National Bridge Inventory (NBI) Structure No. 16-178-0-0101-06-041. The bridge was determined eligible for listing in the NRHP under Criterion C at the state level of significance as part of the 1995 Statewide Historic Bridge Inventory of Metal Truss Bridges.
2. Bridge, US 181 over Burleson Street, 0.80-mile north of Corpus Christi Ship Channel, NBI Structure No. 16-178-0-0101-06-044. The bridge was determined eligible for listing in the NRHP under Criterion C at the state level of significance as part of the 2009 Statewide Historic Bridge Inventory Evaluation of 1945-1965 Bridges.
3. Bridge, US 181 Southbound Off-Ramp over State Spur (SS) 554, 0.35-mile west of Shoreline Drive, NBI Structure No. 16-178-0-0074-06-171. The bridge was determined eligible for listing in the NRHP under Criterion A and Criterion C at the state level of significance as part of the 2009 Statewide Historic Bridge Inventory Evaluation of 1945-1965 Bridges.
4. Bridge, US 181 Northbound On-Ramp over SS 544, 0.35-mile west of Shoreline Drive, NBI Structure No. 16-178-0-0074-06-169. The bridge was determined eligible for listing in the NRHP under Criterion C at the state level of significance as part of the 2009 Statewide Historic Bridge Inventory Evaluation of 1945-1965 Bridges.
5. Bridge, US 181 Northbound over SS 544, 0.35-mile west of Shoreline Drive, NBI Structure No. 16-178-0-0074-06-170. The bridge was determined eligible for listing in the NRHP under Criterion A and Criterion C at the state level of significance as part of the 2009 Statewide Historic Bridge Inventory Evaluation of 1945-1965 Bridges.
6. Bridge, US 181 Southbound over Belden Street, 0.10-mile north of IH 37, NBI Structure No. 16-178-0-0074-06-050. The bridge was determined eligible for listing in the NRHP under Criterion C at the state level of significance as part of the 2009 Statewide Historic Bridge Inventory Evaluation of 1945-1965 Bridges.

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7. Bridge, US 181 Northbound Freeway Connector over US 181, 0.65-mile north of Ship Channel, NBI Structure No. 16-178-0-0101-06-043. The bridge was determined eligible for listing in the NRHP under Criterion C at the state level of significance as part of the 2009 Statewide Historic Bridge Inventory Evaluation of 1945-1965 Bridges.

The proposed action would result in a use of the NRHP-eligible Corpus Christi Harbor Bridge through its removal and replacement, and would result in a use of six additional NRHP-eligible bridges as part of associated highway and interchange reconstruction located within several miles of the new Harbor Bridge, as the bridges are functionally interrelated due to their proximity along US 181. The potential impacts of a specific project alternative to the Harbor Bridge are closely linked to potential impacts to the other bridges through the alternative's physical design and alignment, and indirectly through changes in traffic flow patterns and volumes.

Physical Descriptions and Historical Significance Statements

Pursuant of Section 110 and Section 106 of the National Historic Preservation Act, the bridges were documented and subsequently determined eligible for listing in the National Register of Historic Places (NRHP) as part of TxDOT's Statewide Bridge Inventory of post-1945 bridges. Below are the physical descriptions and historic significance statements for each of the seven associated bridges.

Physical Description

The Corpus Christi Harbor Bridge is a continuous cantilever tied arch steel truss bridge, with a total structure length of 5,819 feet. The bridge's main span is a 1,240-foot-long cantilever steel truss unit, composed of a 387-foot, 6-inch suspended tied-arch center span supported by two 116-foot, 3-inch cantilevered steel truss spans and two 310-foot anchor spans on either side. Major approach spans are two 271-foot simple-span deck truss units. Minor approach spans are 15 welded steel plate girder spans and 37 prestressed concrete girder spans. Main span substructure elements are concrete bent caps and piers supported on pile caps on concrete pilings. Approach span substructure elements are multiple column concrete bent caps and bents on concrete pilings.

The bridge's construction began in 1956 and was completed in 1959. The bridge was designed by the Texas Highway Department's Bridge Division, with the firm of Howard, Needles, Tammen, and Bergendoff as the consulting engineer. The bridge's steel members were fabricated by the U.S. Steel Company and construction was accomplished by several firms under the supervision of the Texas Highway Department. The bridge is currently owned and maintained by TxDOT.

A major rehabilitation of the bridge took place between 1983 and 1987, with strengthening of truss members and full redecking. A subsequent rehabilitation project, completed in 2005, repaired or replaced the following elements: stringer diaphragms, stringer connection angles, stringer expansion bearings, truss lacing, truss bearing clip angles, lateral bracing gusset plates, and numerous rivet connections with bolts. A bridge repainting job in 2010 identified severe rusting, section loss, and deterioration in numerous secondary bridge components, leading to an additional rehabilitation of the bridge. This project was completed in spring 2012, with repairs and replacement of bottom lateral diagonal bracing and gusset plates, sway frame diagonal bracing and gusset plates, and top lateral center gusset plates.

The elevation drawing shows the bridge structure from the left abutment to the right abutment. The bridge is divided into several sections: Prestressed Concrete Beam Units, Structural Steel Plate Girder Units, Truss Units, and Portals/Sway Frames. The drawing includes the following dimensions and labels:

- Abutments:** Abut 1 on the left and Abut 28 on the right.
- Spans:**
 - 7840' ± - 180.50' PRESTR CONC GIRDER SPANS
 - 11000' ± - 849.80' PRESTR CONC GIRDER SPANS
 - 50151' ± - 908.75' PLATE GIRDER SPANS
 - 872.00' ± PLATE GIRDER SPAN
 - 311.75' ± PLATE GIRDER SPAN
 - 820.00' ± PLATE GIRDER SPAN
 - 311.75' ± PLATE GIRDER SPAN
 - 372.00' ± PLATE GIRDER SPAN
 - 46160' ± - 838.75' PLATE GIRDER SPANS
 - 50100' ± - 505.73' PLATE GIRDER SPANS
 - 4870' ± - 280.23' PRESTR CONC GIRDER SPANS
 - 8840' ± - 538.60' PRESTR CONC GIRDER SPANS
 - 6840' ± - 340.95' PRESTR CONC GIRDER SPANS
- Truss Units:** 1242.50' THROUGH TRUSS UNIT
- Portals/Sway Frames:** Located between the truss units.
- Lower Chords:** Indicated in the truss section.
- Total Length:** TOTAL LENGTH OF BRIDGE = 2818.50'
- Elevation:** The drawing is labeled "ELEVATION" at the bottom.

The vertical clearance between the bridge and the Ship Channel water surface is 138 feet. Minimum vertical clearance for vehicular traffic on the bridge is 16 feet, 10 inches. The bridge has a clear roadway width of 36.2 feet in each direction, for a total roadway width of 72.4 feet. The bridge's out-to-out deck width is 82.0 feet. The truss spans of the bridge are not skewed and have no horizontal curve. However, the bridge's south prestressed concrete beam and steel plate girder approach spans are horizontally curved. The bridge carries six lanes of vehicular traffic, with three lanes of traffic in each direction. A solid concrete barrier separates the northbound and southbound traffic. Each travel lane is 11.7 feet in width. There are no shoulders on the bridge. Three-foot-wide sidewalks are on each side of the bridge and are separated from vehicular traffic by 2.25-foot-high solid concrete barriers. The bridge has non-original metal railings at the outside of the pedestrian sidewalk. The bridge has an 8-inch-thick concrete deck and asphaltic concrete pavement wearing surface, installed in 1987 during a rehabilitation project to replace the original 7-inch-thick lightweight concrete deck. The current deck uses lightweight concrete in the central portions of the main truss to reduce load, and normal-weight concrete for the remainder of the bridge.

According to the September 2012 bridge inspection, the bridge's current sufficiency rating is 60. The sufficiency rating, ranging from 0 to 100, measures a bridge's capability to remain in

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vehicular service based on a formula incorporating condition rankings, load capacity, roadway and structure geometrics, traffic counts, presence of suitable detour routes, and other bridge inspection factors. The sufficiency rating also serves as a basis for establishing eligibility for replacement or rehabilitation under the Federal Highway Bridge Program.¹

A rehabilitation project completed in December 2011 raised the bridge's current operating load rating to HS 26.0. The Operating load rating is defined as the maximum permissible live load that can be placed on the bridge. Photographs of the existing bridge are included in Appendix C.

Significance

The Corpus Christi Harbor Bridge was determined eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance as part of the 1995 Statewide Historic Bridge Inventory of Metal Truss Bridges. The bridge, with its unique combination of a tied-arch center span and cantilevered trusses, is considered the pinnacle of Texas metal truss bridge construction, in terms of technological complexity. The truss design allowed for the exceptional clear span length, structure length, and vertical clearance needed to accommodate ship traffic of the period. When constructed, the bridge was the largest single project of the Texas Highway Department. It is also significant as the first large bridge in Texas with precast prestressed and precast post-tensioned concrete beams, used for the bridge's approach spans. The bridge is considered the most important design work of Texas Highway Department bridge engineer Vigo Miller and was featured in *Time* magazine in 1964 for its exceptional beauty. The bridge's primary character-defining features are its overall cantilevered tied-arch truss design and its prestressed concrete approach spans.

US 181 Bridge at Burleson Street

Physical Description

This bridge is a prestressed concrete girder bridge, with a total structure length of 602 feet. The bridge has 10 spans and a curved alignment. Main and approach spans consist of 13 prestressed concrete girders with diaphragms, and the maximum span length is 60 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has solid concrete barriers between northbound and southbound lanes and at the edge of the deck. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1958 and designed by Robert L. Reed of the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The bridge that carries US 181 over Burleson Street is a 10-span prestressed concrete girder bridge constructed in 1958. It is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into American Association

¹ Ficker, Maryellen and Heather Goodson, *Historic Bridge Programmatic Section 4(f) Guidelines and Standards of Uniformity*, Historical Studies Report No. 2009-02, B-4; Texas Department of Transportation, *Bridge Project Development Manual*, December 2012, 2-5.

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of State Highway Officials (AASHO) specifications for nationwide use. The bridge is also significant as a design of Texas Highway Department design engineer Robert L. Reed, who was recognized as an innovative Texas bridge designer of the period. Reed, who began his career at the Texas Highway Department in 1947, was noted as an early proponent of prestressed concrete. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 bridge at Burleson Street is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Northbound Freeway Connector Bridge over US 181

Physical Description

This bridge is a prestressed concrete girder bridge, with a total structure length of 560 feet. The bridge has 10 spans and a curved alignment. Main and approach spans consist of five prestressed concrete girders with diaphragms; the maximum span length is 60 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1958 and designed by Robert L. Reed of the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The bridge that carries the US 181 northbound frontage road over the main lanes of US 181 is a 10-span prestressed concrete girder bridge constructed in 1958. It is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHO specifications for nationwide use. The bridge is also significant as a design of Texas Highway Department design engineer Robert L. Reed, who was recognized as an innovative Texas bridge designer of the period. Reed, who began his career at the Texas Highway Department in 1947, was noted as an early proponent of prestressed concrete. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 northbound frontage road bridge over the main lanes of US 181 is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Southbound Bridge over Belden Street

Physical Description

This bridge is a three-span prestressed concrete girder bridge, with a total structure length of 180 feet. Main and approach spans consist of nine prestressed concrete girders with diaphragms; the maximum span length is 60 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard design metal pipe railing. The substructure consists of concrete

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abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Southbound bridge at Belden Street in Corpus Christi is a three-span prestressed concrete girder bridge constructed in 1959. The bridge is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 Southbound Bridge at Belden Street is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Southbound Off-Ramp Bridge over SS 544

Physical Description

This bridge is a prestressed concrete girder bridge, with a total structure length of 240 feet. The bridge has four spans and a curved alignment. Main and approach spans consist of eight prestressed concrete girders with diaphragms; the maximum span length is 70 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing along the east edge of the deck and a solid concrete barrier with chain-link safety fence along the west edge of the deck. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Southbound off-ramp at SS 544 in Corpus Christi is a four-span prestressed concrete girder bridge. Constructed in 1959, the bridge is historically significant as one of the earliest structures associated with the Texas Highway Department's push to construct three- and four-level urban interchanges during the period, identified as an important transportation-related initiative. Although grade-separation structures were widely used across Texas prior to World War II, the first three-level interchange was built in 1953 and the first four-level interchange was built in 1958, coinciding with the development of more complicated roadway networks and heavier traffic volumes. The bridge is also significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. Alterations to the bridge are limited to removal of the original railing. The railing replacement is a relatively minor alteration that relates to integrity of design, materials, and workmanship. The bridge retains its integrity of location, setting, feeling, and association. The alteration results in minimal loss of the qualities that define the bridge's overall historic character and does not diminish its ability to convey

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historical or engineering significance. The US 181 southbound off-ramp at SS 544 is eligible for listing in the NRHP under Criterion A in the area of Transportation at the state level of significance. It is also eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance.

US 181 Northbound On-Ramp Bridge over SS 544

Physical Description

This bridge is a prestressed concrete girder bridge, with a total structure length of 501 feet. The bridge has nine spans and a curved alignment. Main and approach spans consist of six prestressed concrete girders with diaphragms; the maximum span length is 70 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing on its west side and a solid concrete barrier with chain-link safety fence on its east side. An integrated pedestrian bridge/walkway is attached to the east side of the bridge near its north abutment that extends eastward across a northbound on-ramp toward the Nueces County Courthouse. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Northbound on-ramp at SS 544 in Corpus Christi is a nine-span prestressed concrete girder bridge constructed in 1959. The bridge is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 northbound on-ramp over SS 544 is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Northbound Bridge over SS 544

Physical Description

This bridge is a prestressed concrete girder bridge, with a total structure length of 401 feet. The bridge has seven spans and a curved alignment. Main and approach spans consist of eight prestressed concrete girders with diaphragms; the maximum span length is 70 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing along the west edge of the deck and a concrete barrier with chain-link safety fence along the east edge of the deck. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by James R. Graves and Charlie Covill. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Northbound Bridge at SS 544 in Corpus Christi is a seven-span prestressed concrete girder bridge. Constructed in 1959, the bridge is historically significant as one of the

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earliest structures associated with the Texas Highway Department's push to construct three- and four-level urban interchanges during the period, identified as an important transportation-related initiative. Although grade-separation structures were widely used across Texas prior to World War II, the first three-level interchange was built in 1953 and the first four-level interchange was built in 1958, coinciding with the development of more complicated roadway networks and heavier traffic volumes.

The bridge is also significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. This bridge is also significant as an important work of a master engineer, designer, fabricator, or builder. The bridge's superstructure was designed by Texas Highway Department senior design engineer James R. Graves, recognized as an innovative Texas bridge designer of the period. Graves was particularly noted for his work with early prestressed concrete bridges. He designed the FM 237 at Coleto Creek bridge in 1956, which was the Texas Highway Department's first prestressed, pretensioned concrete beam bridge and the first bridge in the United States to use neoprene bearing pads. Graves also developed the Texas Highway Department's first set of prestressed concrete beam standards in 1956.

Alterations to the bridge are limited to removal of the original railing. The railing replacement is a relatively minor alteration that relates to integrity of design, materials, and workmanship. The bridge retains its integrity of location, setting, feeling, and association. The alteration results in minimal loss of the qualities that define the bridge's overall historic character and does not diminish its ability to convey historical or engineering significance. The US 181 Northbound bridge at SS 544 is eligible for listing in the NRHP under Criterion A in the area of Transportation at the state level of significance. It is also eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance.

Basis for the Proposed Action

The project's need and purpose relates to existing deficiencies of the existing Harbor Bridge, which carries US 181 over the Corpus Christi Ship Channel. However, implementation of rehabilitation or replacement project alternatives would also require alterations to, or replacement of, six additional bridges that are in close proximity to the Harbor Bridge in order to meet design and safety standards.

Two primary needs have been identified for the Corpus Christi Harbor Bridge project:

- (1) Long-term maintenance and operability
- (2) Safety risks from design deficiencies

In addition, the project has three secondary objectives:

- (1) Economic opportunity by addressing clearance restrictions to the port's inner harbor;
- (2) Connectivity to local roadway system

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(3) Meet traffic demands for design year and projected volume increase

The primary needs and secondary objectives are discussed below.

Long-Term Maintenance and Operability

The existing Harbor Bridge is a combination of prestressed concrete beam spans, steel plate girder spans, simple deck truss spans, continuous deck truss spans, and suspended tied arch spans. The Harbor Bridge is a fracture-critical structure, meaning the key structural elements supporting the bridge are not themselves supported by additional and redundant elements. This means that if a key support fails, the bridge would be in danger of collapse. This does not mean the bridge is inherently unsafe, only that the bridge design does not include additional structural members to carry loads in the event of a single member's failure. There are currently at least 280 fracture-critical members on the existing bridge. Fracture-critical members include link pins, deck truss sway frames (including the diagonal members and gusset plates), and floor beams for the deck truss and cantilever truss units. A fracture-critical member is defined by the FHWA's National Bridge Inspection Standards as "as a steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse."²

Based on a special September 2007 Fracture-critical Inspection and a December 2008 Bridge Condition Survey, TxDOT undertook a major rehabilitation of the bridge between 2010 and 2012 to address the following major findings:

- Significant section loss of some gusset plates (metal plates used to connect multiple structural members of a truss), particularly gussets connecting top chords to verticals in the bridge's deck trusses
- Missing or broken rivets and anchor bolts
- Corrosion, pack rust, and section loss in deck sway bracing
- Floorbeam and stringer stiffener section loss
- Sagging lateral bracing under the deck
- Leaking deck joints
- Widespread rusting, with pack rust, knife edging, and paint failure prevalent throughout the bridge

The fracture-critical inspection and condition survey did not include the pre-stressed girder or plate-girder approach spans. Later inspections noted severe cracking of pre-stressed concrete beam ends over water. In response to the bridge's deteriorated condition, TxDOT undertook immediate critical repairs to the bridge's steel members in early 2009, with a more extensive rehabilitation between 2010 and 2012. The rehabilitation was designed to provide 15 to 20

² Defined at 23 CFR Part 650.305.

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years of additional service life while long-term plans were developed for the US 181 at Corpus Christi Ship Channel crossing.

The recent rehabilitation addressed immediate safety concerns. However, the bridge's most recent inspection, conducted in September 2012, notes continuing or reoccurring corrosion issues almost immediately following rehabilitation, underscoring the bridge's ongoing maintenance and operability issues. Specifically, conditions of the bridge's primary components were noted as following:

- Deck – Condition Rating 6 (Satisfactory Condition – limited minor deterioration of structural elements): Minor cracks in deck soffit in most spans; some delamination and spalling with exposed rebar in three spans; moderate to severe fracturing and spalling of concrete median rail.
- Superstructure – Condition Rating 5 (Fair Condition – extensive minor deterioration of structural elements): Main truss members have pitting corrosion losses throughout and at gusset plate connections. Losses are extensive and corrosion is continuing, but recent painting in rehabilitation project has greatly reduced rate of corrosion. Outside and adjacent steel stringers for truss spans have up to 50 percent corrosion loss of bottom flanges, with several areas of continuing active corrosion. Truss floorbeams have areas of active corrosion along top flange deck interface, web stiffeners, and some stringer connections. Paint system is beginning to break down at floorbeam end connections with active corrosion re-initiating. Gusset plates still exhibit significant section losses with some perforations. Significant section loss on sway frames, portal frames, and horizontal bracings, with perforations, knife edge corrosion, and saw-tooth section loss. Minor to moderate end spalling of prestressed concrete beams, with moderate delamination observed in one span.
- Substructure – Condition Rating 6 (Satisfactory Condition): Extensive delamination cracking in four bent caps and in concrete columns in two bents. Minor cracks and delaminations in most other bent caps, columns, and backwalls.
- Channel – Condition Rating 8 (Very Good Condition): No comments noted.
- Approaches – Condition Rating 7 (Good Condition – some minor problems): Minor cracks in south approach retaining walls; minor pavement wear.
Today the structure carries higher dead loads (the weight of the bridge itself) and live loads (the weight of vehicular traffic, wind, water and other factors) than the loads for which it was originally designed in 1959. The bridge was originally designed for a standard H20-S16-44 live load, equating to a hypothetical vehicle with a front tractor axle weighing 4 tons, a rear tractor axle weighing 16 tons, and a semitrailer axle weighing 16 tons. The tractor portion alone weighs 20 tons, but the gross vehicle weight is 36 tons. According to original bridge plans, the bridge was designed for a dead load panel load of 107,000 pounds per truss including concrete deck, wearing surface, and railing.

Live loads have increased with increased traffic volumes and greater weight of typical vehicular traffic, particularly for commercial trucks and heavy-load vehicles that use the bridge. The dead load on the structure was increased in 1987, when the original lightweight concrete deck was partially replaced with a normal-weight deck. Structural modifications undertaken in the late

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1980s rehabilitation provided additional reinforcement and strengthening, with changes to the truss's structural configuration, addition of thicker gusset plates, and replacement and upgrade of many connections. However, the increased load nonetheless fatigues the members and contributes to the accelerated maintenance needs of the structure. Heavier trucks and greater ADT lead to more fatigue and greater stress range as defined by the number of cycles to failure. The joints and connection members will continue to deteriorate and will ultimately have to be replaced, even if continued maintenance efforts are performed (TxDOT 2012).

Another major factor to consider in maintaining the structural integrity of the Harbor Bridge is corrosion. The steel bridge resides in a saltwater environment that requires frequent routine cleaning and painting to minimize corrosion, as well as periodic bridge rehabilitation. The combination of salt-laden air, year-round windy conditions, and warm air temperatures increases the potential for steel corrosion to occur (TxDOT 2012). The effect that the corrosive saltwater environment has on exposed metal elements results in frequent and costly maintenance that disrupts vehicular and maritime traffic. Table 2 lists structural repair and painting work completed over the last 30 years. It should be noted that painting tasks until the early 1990s were completed by State forces and are not included in this table.

Construction Letting Date	Work Description	Bid Amount
July 1985	Rehabilitate bridge and north approaches	\$6,243,265.35
May 1987	Rehabilitate and replace causeway and south approaches	\$22,095,389.45
February 1988	Clean, paint, replace rivets and bolts	\$1,968,000.00
November 1992	Clean and paint structure	\$1,980,000.00
November 1994	Paint bridge	\$1,759,000.00
July 2002	Structural repair	\$5,929,504.00
May 2004	Clean and paint bridge	\$7,911,000.00
January 2010	Clean and paint bridge	\$18,383,880.00
January 2010	Structural repair	\$4,781,830.00
TOTAL COSTS		\$71,051,868.80

Table 2. Harbor Bridge Rehabilitation and Maintenance Costs, 1985-2012.
(Source: Texas Department of Transportation)

Over the past 30 years, maintenance costs have exceeded \$71 million, unadjusted for inflation. A cost analysis, completed in 2012 by HDR, Inc. for TxDOT's Bridge Division, found that extending the service life of the current Harbor Bridge to 2086 would cost an estimated \$279,471,206 in 2012 dollars (or \$401,430,000 using probable 2012 net present value). Periodic major rehabilitation or reconstruction projects will be required to maintain operability beyond the 15 to 20 years of additional service life provided by the recently completed rehabilitation. The September 2012 inspection illustrates the recurring deterioration of structural and secondary members and the bridge's ongoing maintenance needs. Future rehabilitation projects will need to address secondary members, lateral gusset plates, and other members that were not repaired in the recent project.

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While phased-array ultrasound testing can be used to evaluate the condition of the tied-arch link pins, this technology is not effective to examine other non-visible members such as multi-layered gusset plates and the top flange of the bridge's floorbeams. X-ray testing of these members would likewise be very difficult and expensive due to the thickness of the truss members, with estimated costs of up to \$20,000 per truss connection point. X-ray testing would also require full closure of the bridge for extended periods due to the high levels of radiation needed to fully penetrate the truss members. Full deck removal would be required to adequately examine and evaluate the condition of the floorbeams, and allow for repair or replacement of deteriorated members. Floorbeam replacement would likely require full closure of the bridge.

The 2012 cost analysis assumed the following maintenance and rehabilitation needs:

- Yearly maintenance – Composed of localized repainting, routine deck maintenance to joints and cracks, localized rivet replacement, and localized rust treatment for pack rust or knife edging.
- Recurring painting on a 15-year life cycle – Composed of water blasting, surface preparation, prime coat, and paint for truss and plate girder spans.
- Rehabilitation on a 15-year life cycle – Would extend service life by improving existing members, with specific work varying depending on structure condition. The 2008-2010 rehabilitation focused on gusset plates. The next projected rehabilitation would likely focus on top flanges of floor beams that experience section loss. Future rehabilitations could focus on bearings and concrete substructure elements. Rehabilitation costs also assume work to the Harbor Bridge's prestressed concrete approach spans.
- Restoration on a 30-year life cycle – Composed of more robust repairs that would likely include replacement of key elements such as bridge deck or main truss ground-level roller bearings. This work could also include railing replacement, plate girder and deck truss repair, and restoration of truss joints.
- Periodic bridge inspection – The continuing deterioration and numerous fracture-critical members result in increased inspection costs. The cost analysis assumed routine and fracture-critical inspections every two years, ultrasonic testing of bridge pins every five years, and baseline inventories every 15 years following rehabilitation/restoration projects.

Even with repairs of this magnitude, the bridge will remain a fracture-critical structure due to its inherent design.

Safety Risks from Design Deficiencies

Numerous geometric deficiencies, as presented below, exist on the current US 181 facility, including the Harbor Bridge. These deficiencies lead to deteriorating traffic conditions and increased accident levels. In general, crash rates on US 181 within the project limits exceed the statewide average for similar facilities (urban, four lanes or more, divided roadway classification). The 2009 crash rate per 100 million vehicle miles traveled for US 181 within the project limits was 130.97 accidents, whereas the statewide average crash rate in 2009 for similar facilities

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was 114.65, a difference of 14 percent.³ Corpus Christi Police Department statistics from 2009 indicated that the Harbor Bridge was the most dangerous driving location in the city, with 42 collisions reported on the bridge in that year.⁴

The current US 181 facility, including the Harbor Bridge, does not meet current FHWA and TxDOT roadway and bridge design standards. The FHWA's *Design Standards for Highways* (23 CFR 625) and TxDOT's *Roadway Design Manual* and *Bridge Design Manual* provide guidelines for various elements of roadway and bridge design, including traffic characteristics, shoulder widths, horizontal and vertical alignment, and on- and off-ramp access. Several elements of the current US 181 facility do not meet these standards, as detailed below.

1) The existing Harbor Bridge and immediate US 181 approaches do not have shoulders. There are only sporadic partial-width outside shoulders on the bridge's approach roadway, contributing to increased levels of congestion when even minor traffic crashes and breakdowns occur. As stated in the TxDOT *Roadway Design Manual*, "shoulders, in addition to serving as emergency parking areas, lend lateral support to travel lane pavement structure, provide a maneuvering area, increase sight distance of horizontal curve, and give drivers a sense of safe, open roadway."⁵ The lack of shoulders also means the clearance between the travel lanes and the railing on the existing bridge does not meet current standards. The TxDOT *Roadway Design Manual* calls for a median shoulder width of 10 feet and outside shoulder width of 10 feet for a six-lane divided freeway.⁶ The TxDOT *Bridge Project Development Manual* states, "for all new and replacement projects (4R)...all bridges will carry the full usable shoulder width of the approach roadway across the structure. Bridge widths must conform to the requirements in Chapter 3 of the *Roadway Design Manual* in which the design criteria for 4R projects are represented for various roadway functional classifications and traffic volumes."⁷

2) The existing US 181 approaches to the Harbor Bridge are on a five percent vertical slope, which exceeds the maximum design grade for a level urban freeway, as defined in the TxDOT *Roadway Design Manual*. The maximum grade for a level urban freeway is 4 percent for design speeds of 55 miles per hour or less, or 3 percent for design speeds of 60 miles per hour or greater.⁸ The combination of the steep vertical grade and the horizontal curvature on both the north and south ends of the existing bridge creates a situation where vehicles can be travelling downhill speeds and entering into sharp "S" curves at speeds faster than the posted 55 miles per hour (mph) speed. This situation is exacerbated by the high percentage of truck traffic (9 percent of total traffic volume) using US 181 at this location, with industrial traffic from the Port of Corpus Christi vicinity and the highway's role as a regional traffic artery. The TxDOT *Roadway Design Manual* notes that "the effects of rate and length of grade are more pronounced on the operating characteristics of trucks than on passenger cars and thus may introduce undesirable

3 Coordination Plan, p. 7.

4 Rosenberg, Katherine. "Harbor Bridge was city's most dangerous road." Corpus Christi Caller-Times, January 23, 2010. Accessed on www.caller.com, Jan. 19, 2012.

5 Roadway Design Manual, p. 2-44.

6 Roadway Design Manual, p. 3-63 and 3-66.

7 Bridge Project Development Manual, p. 3-2.

8 Roadway Design Manual, p. 2-31.

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speed differentials between the vehicle types." Based on the existing vertical slope and length of grade, a heavy truck entering the Harbor Bridge at full speed would be expected to have a speed reduction between 25 and 30 mph, far exceeding the 10 mph value above which is typically considered to be an unreasonable reduction of speed (see Figure 3).⁹

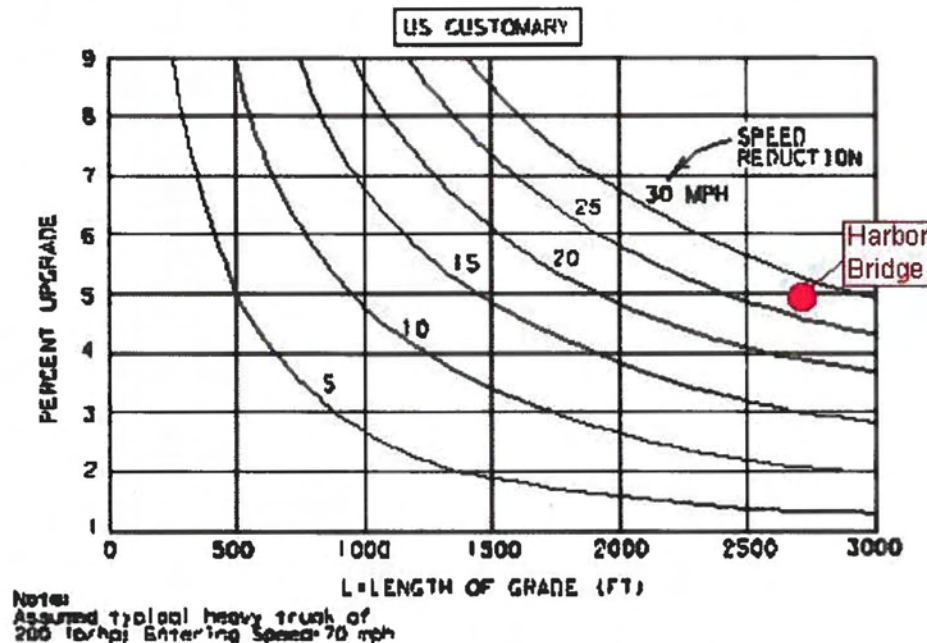


Figure 3. Critical Lengths of Grade for Design,
Source: TxDOT Roadway Design Manual, 2010.

3) Certain ramp lengths do not provide sufficient acceleration or deceleration distances to meet current design standards for freeway ramps. One example is the US 181 northbound entrance ramp from westbound SS 544/Mesquite Street, located south of the Harbor Bridge near the US 181 and IH 37 interchange. This low-speed entrance ramp has approximately 400 feet acceleration length and 250 feet of taper length, an insufficient distance for traffic to safely merge with traffic from an adjacent on-ramp (from North Lower Broadway Street) and the US 181 northbound main lanes. In addition, the ramp's vertical grade and sharp horizontal curvature reduces drivers' ability to effectively merge into the main traffic lane. At a roadway design speed of 55 mph, the TxDOT design standard for freeway entrance ramps is 960 feet of acceleration distance and a minimum of 250 feet of taper distance assuming a vehicle begins at a stop condition, similar to the existing signalized intersection at SS 544 and Mesquite Street. In addition, the above factors are based on a level grade. With the ramp's vertical grade, the design standard for acceleration lane length on a turning curve is adjusted upwards by a factor of 1.35 to 1.45.¹⁰

⁹ Ibid.

¹⁰ TxDOT Roadway Design Manual, pp. 3-46 and 3-47.

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The US 181 southbound exit ramp to the Port Area, located immediately south of the Harbor Bridge, is another example of a ramp that does not meet current design standards. The ramp distance provides approximately 250 feet of taper length and 350 feet of deceleration length prior to a sharp curve to intersect Power Avenue; the ramp has an existing 55 mph US 181 freeway design speed and a 15 mph speed for the entrance curve to Power Avenue. The length of this ramp combined with the sharp curvature and the steep vertical grade coming down off of the bridge makes it difficult for vehicles, particularly large trucks, to safely decelerate before merging with local traffic on the service road. The existing TxDOT freeway design criteria call for a minimum taper length of 250 feet and a minimum deceleration length of 455 feet. The TxDOT *Roadway Design Manual* notes that "where providing desirable deceleration length is impractical, it is acceptable to allow for a moderate amount of deceleration (10 mph) within the through lanes and to consider the taper as part of the deceleration length."¹¹ However, the downward vertical grade of the Harbor Bridge approaching this ramp makes deceleration in the through lanes difficult.

Another example of inadequate ramp configuration is the US 181 southbound exit ramp to downtown Corpus Christi, which does not provide sufficient distance for motorists to safely decelerate before reaching the split of the ramp into eastbound Twigg Street and southbound Upper Broadway Street. The existing ramp provides a deceleration distance of 500 feet to the ramp's split, while the minimum design standard for deceleration length based on the roadway's design speed, posted speed, and ramp type is 800 feet.

4) The current configuration of southbound US 181, located just south of the Harbor Bridge, does not meet current design standards. Approaching downtown Corpus Christi from the north, motorists are presented with a three-decision breakpoint, meaning the three-lane highway offers three separate destinations via US 181 (downtown Corpus Christi, IH 37/SH 286, and Staples Street) from the same point on the highway. The spacing between the three exit ramps does not comply with current design criteria. The simultaneous three-directional split does not conform to current design criteria. The TxDOT *Roadway Design Manual* provides several different types of interchanges, including a four-level directional interchange with separate two-decision breakpoints that avoid use of left-hand exit ramps.¹² The left-hand exit ramp does not meet typical driver expectations. The *Roadway Design Manual* states that "right-side ramps are markedly superior in their operational characteristics and safety to those that leave or enter on the left. With right-side ramps, merging and diverging maneuvers are accomplished into or from the slower moving right travel lane. Since the majority of ramps are right-side, there is an inherent expectancy by drivers that all ramps will be right-side, and violations of driver expectancy may adversely affect operation and safety characteristics."¹³

In addition, as noted above, the ramp to downtown Corpus Christi does not allow motorists sufficient distance to decelerate before reaching the exit to Upper Broadway Street (approximately 550 feet). The ramp provides deceleration distances of about 1,000 feet to the intersection with SS 544/Mesquite Street and about 1,300 feet to the signalized intersection with Chaparral Street, above minimum design criteria but relatively short given the posted speeds from US 181 into a highly urbanized area. The three-decision breakpoint interchange and short

11 Roadway Design Manual, pp. 3-91 and 3-92.

12 Roadway Design Manual, pp. 3-81 and 3-82.

13 Roadway Design Manual, p. 3-90.

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ramp deceleration distances increase the likelihood of erratic movements and accidents, especially for drivers unfamiliar with the Corpus Christi area, an important consideration given the numerous tourist attractions in the immediate vicinity of the interchange.

Another safety-related concern is the designation of both US 181, including the Harbor Bridge, and IH 37 within the project area, as major hurricane evacuation routes (TxDOT 2011). US 181 serves as a primary evacuation route for San Patricio County to the north and an alternate evacuation route to IH 37 for the city of Corpus Christi.¹⁴ During a storm event IH 37 is used for evacuation until the traffic volumes reach the maximum highway capacity, which includes the use of the shoulder evacuation lane and contraflow lanes (reversing the south bound lanes).¹⁵ Even using the shoulder lanes and contraflow plans, IH 37 cannot handle a major evacuation of Corpus Christi and surrounding areas. Once the traffic volume on IH 37 reaches capacity, traffic is directed to US 181. Therefore, a major evacuation would use both the Harbor Bridge and the Joe Fulton Trade Corridor (Navigation Boulevard, Market Street, and Causeway Boulevard) running from US 181 along the north side of the inner harbor to Carbon Plant Road, which connects to IH 37. The estimated time for evacuation of Nueces County ranges from 14 hours for a Category 1 hurricane to 32 hours for a Category 5 hurricane.¹⁶ Given the design deficiencies outlined above, US 181 carries with it the increased risk of becoming severely congested in the event of an accident or vehicle breakdown during an emergency hurricane evacuation.

Project Purposes

Based on the primary needs listed above, the purpose of the proposed project is to:

- 1) Maximize the long-term highway operability of the US 181 crossing of the Corpus Christi Ship Channel; and
- 2) Correct design deficiencies and bring US 181, including the Harbor Bridge and six additional bridges that serve as integral parts of the highway facility and nearby interchanges, into compliance with current design standards to improve safety for the travelling public, including during hurricane evacuations.

Additional Project Objectives

In addition to the primary purpose and needs outlined above, TxDOT and the FHWA seek to achieve the following objectives, to some degree, in implementing the proposed action:

- 1) Provide transportation infrastructure to support economic opportunities in the Corpus Christi area and Coastal Bend region; and

¹⁴ Texas Department of Transportation, *Hurricane Evacuation Routes*. Map dated June 10, 2011. Available at www.dot.state.tx.us/travel/hurricane.

¹⁵ Texas Department of Transportation, *Interstate 37 Hurricane Evacuation Contraflow Route*. May 11, 2010. Available at www.dot.state.tx.us/travel/hurricane; Texas Department of Transportation, *Corpus Christi Hurricane Evacuation Routes 2008*.

¹⁶ Lindell, Michael K., Carla Prater, and Jie Ying Wu, *Hurricane Evacuation Time Estimates for the Texas Gulf Coast*. College Station, Texas: Hazard Reduction and Recovery Center, Texas A&M University, 2002, 6.

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2) Consider the connectivity of US 181 to the local roadway system and its effects on adjacent neighborhoods.

These objectives are important in the overall context of the proposed project in that they address additional underlying problems, described below, associated with the Harbor Bridge and US 181 in the project area.

Provide Transportation Infrastructure to Support Economic Opportunities in the Area

The Corpus Christi Metropolitan Planning Organization (MPO) has identified the replacement of deficient bridges as a type of project intended to achieve the goals of its 2010-2035 MTP.

Specifically, the MTP lists the following goals:

- Reduce congestion by maximizing the capacity and efficiency of the existing major highways and streets.
- Improve the safety of our transportation network through improved efficiency and effectiveness of major street and highway facilities.
- Provide new facilities, improved facilities, and transportation services that expand the economic opportunities in the area.
- Provide new facilities, improved facilities, and transportation services that will support the maintenance of our attainment status and improve air quality.
- Provide new facilities, improved facilities, and transportation services that will increase the value of transportation assets.

The MTP lists the replacement of the Harbor Bridge—prioritized partly on the basis of its use as a hurricane evacuation route—as one of the projects whose implementation would be expected to achieve the above goals. In addition, the MTP describes US 181 as a critical connection for the region's efficient movement of freight and emergency evacuation.

With respect to regional connectivity, the MPO considers US 181 a priority corridor in the future expansion of IH 69 to connect directly to the Port of Corpus Christi, the sixth-largest port in the United States in total tonnage and the primary economic engine for the Texas Coastal Bend.¹⁷ The Port's mission statement is "to serve as a regional economic development catalyst while enhancing and protecting its existing industrial base and simultaneously working to diversify its international maritime cargo business." In a 2003 Economic Impact Study conducted on the Port's behalf, data were presented showing that the activities at the Port in that year were responsible for 39,905 jobs in Texas and about \$2.2 billion of personal income (Martin Associates 2004). The Corpus Christi MPO's 2010-2035 MTP identifies as an action item

¹⁷ American Association of Port Authorities, "U.S. Port Rankings by Cargo Volume 2010," <http://aapa.files.cms-plus.com/Statistics/2010%20U.S.%20PORT%20RANKINGS%20BY%20CARGO%20TONNAGE.pdf> (accessed 4 February 2013).

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"improve ocean liner handling facilities" through development of a long-term plan for replacement of the Harbor Bridge.¹⁸

Consider Connectivity to Local Roadways and Effect on Adjacent Neighborhoods

Access to the City's museum district (including Bayfront Science Park) on the east side of US 181, as well as major traffic generators on the west side (including Whataburger Field professional baseball stadium, the Concrete Street Amphitheater, and the Congressman Solomon P. Ortiz International Center), is not direct and results in congestion on US 181 and local downtown roadways during major events. The combination of US 181 and IH 37, constructed in the late 1950s to early 1960s, modified the local roadway network such that access to uptown and downtown Corpus Christi, particularly from the residential areas north of IH 37, was made longer and less direct. Locally, this has had the effect of creating a barrier between those neighborhoods and the Corpus Christi CBD.

Detour route considerations

The surrounding communities and Corpus Christi suburbs would be impacted in the event of intensive repairs or rehabilitation of the bridges. Partial or full closure of the bridges would require the corpus Christi Harbor Bridge to be fully closed for a minimum of six months with the potential for longer closure if project delays take place. Such closure would remove the roadway from use as a hurricane evacuation route and could prove disastrous in the event of a hurricane during the closure. Full closure would also cause extensive travel disruptions to persons using the US 181 corridor between Corpus Christi and points north.

The distance between downtown Corpus Christi and the northern suburb of Portland is 8.8 miles via US 181. With Harbor Bridge closure, the most direct detour routes would be 42.6 miles via Odem and Calallen, or 59.3 miles via Mustang Island and Aransas Pass. Both detour routes include two-lane roadways with much less traffic capacity than the volumes used on US 181, and the Mustang Island/Aransas Pass route includes the Port Aransas ferry across Packery Channel. The ferry service would not be able to handle the large traffic volumes or the heavier-load commercial traffic that currently use the Harbor Bridge.

Alternatives Considered

Since the project's need and purpose relates to existing deficiencies of the existing Harbor Bridge, which carries US 181 over the Corpus Christi Ship Channel, only the no-build and build alternatives were considered. The no-build alternative ignores the basic transportation need. It does not correct the situation that causes the bridge to be considered functionally deficient. Under the no-built alternative the existing bridge would continue to decline, eventually rendering the facility inoperable. The following build alternatives and options within the alternatives were investigated:

1. No build alternative – do nothing, which involves no expenditure of federal funding
2. Bypass and leave as a monument
3. Rehabilitate for continued vehicular use carrying two-way traffic (avoidance alternative)
4. Rehabilitate for continued vehicular use carrying two-way traffic (use alternative)
5. Remove/replacement of the existing structure on current alignment

¹⁸ Corpus Christi Metropolitan Planning Organization, *Metropolitan Transportation Plan fiscal years 2010-2035*.
Corpus Christi: Corpus Christi Metropolitan Planning Organization, 2009.

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In accordance with Section 106 TxDOT has undertaken efforts to preserve the historic bridge as part of the project planning and the development process. An engineering feasibility study was conducted as part of the planning process. TxDOT engineers evaluated possible preservation alternative for the continued use of the bridge using current roadway and bridge design standards. In addition, engineers also applied the minimum criteria established for Historic Bridges. The following is a discussion of the engineer's findings and recommendations.

Measures of Effectiveness

In the NEPA and public involvement processes, project planners identified purposes for the proposed project to address the identified needs. Criteria of effectiveness were then developed to evaluate whether a particular alternative serves the project purpose and thereby addresses the identified needs. While a matrix similar to this one was initially developed for NEPA decision-making,

Need	Project Purpose	Criteria	Measure
Difficulty in Long-Term Maintenance and Operability	Maximize long-term operability of the US 181 Crossing of the Corpus Christi Ship Channel	Reduces cost and frequency of bridge maintenance	Uses non-corrodible building or maintenance materials to limit extent, frequency, and cost of routine and structural maintenance
		Extends operational life of bridge well beyond expected lifespan of existing bridge	Uses a 100-year design life for the rehabilitated or replaced structure
Safety Risks/Design Deficiencies/Hurricane Evacuation	Improve safety for traveling public, including during hurricane evacuations	Corrects geometric deficiencies	Adds shoulders to bridge and approaches; reduces vertical grade; corrects sharp horizontal curves; provides ramp lengths commensurate with design speed; provides sufficient exit ramp spacing
		Upgrades facility to current design standards where appropriate, allowing a minimal number of design exceptions when justified due to geometric or environmental constraints	Meets FHWA National Highway System standards (36 CFR 625.4) and TxDOT's <i>Roadway Design Manual</i> and <i>Bridge Design Manual</i>
		Serves as a reliable, long-term hurricane evacuation route	Meets State standards for determining transportation routes for hurricane evacuation in the Corpus Christi area

Table 3. Measures of Effectiveness

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(Source: Texas Department of Transportation)

"No-build" Alternatives

Alternative 1a: Do Nothing

This alternative does not address the basic need and purpose for the project. This alternative leaves the existing structure in place, without bypass, additional rehabilitation, or replacement. In addition, this alternative does not require acquisition of additional right-of-way. Under this alternative, the bridge would undergo only basic routine maintenance such as painting, pavement repair, and periodic replacement of broken rivets or bolts. This alternative would not correct existing structural problems.

This alternative does not address the basic needs of the project. Although the most recent rehabilitation project increased the Harbor Bridge's operating load rating and extended its lifespan by approximately 15 to 20 years, corrosion and deterioration has already resumed at the bridge. If left unresolved, the bridge will remain a fracture-critical structure, continue to deteriorate, and replacement will ultimately be the only available option. In addition, maintenance costs are expected to increase because of the structure's age, the increased loading demand, and the continuous exposure of the steel bridge elements to the saltwater environment. Routine maintenance would only include spot-painting and periodic replacement of missing or blossomed rivets. This alternative does not address the long-term maintenance and operability needs of the project.

In addition, this alternative does not address existing safety risks and design deficiencies related to approach roadways and geometry, degree of vertical slope, and lack of shoulders. These issues include the steep 5 percent vertical slope of the US 181 approaches to the Harbor Bridge, the "S" curves at the bridge approaches, short entrance/exit ramps, and lack of shoulders on the bridge and its immediate approaches. In addition, this alternative would not provide US 181 with improvements needed for its use as a reliable hurricane evacuation route.

Moreover, this alternative does not address other project objectives, which include meeting projected future traffic demand, design-year capacity standards, and issues surrounding the economic opportunity of the Port of Corpus Christi and access to the Port's Inner Harbor. In addition, the no-build alternative does not address inadequate connectivity to the local roadway network, which currently results in congestion and a perceived separation between adjoining neighborhoods. However, improvements to US 181 or IH 37 that do not involve the Harbor Bridge itself could improve connectivity to a lesser degree.

The Do Nothing alternative does not meet the project's stated needs and purposes. The Do Nothing alternative retains the existing fracture-critical Harbor Bridge structure and fails to address the long-term operability of the Harbor Bridge and the rising cost of ongoing maintenance associated with the bridge's corrosion and deterioration. It also leaves existing safety and design deficiencies unaddressed, such as lack of shoulders, steep vertical grade, and inadequate ramp geometry. Lastly, the Do Nothing alternative would not meet the other stated project objectives or improve traffic and congestion in the event of a hurricane.

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Alternative 1b: Transportation System Management

This alternative leaves the existing structure in place and uses transportation system management (TSM) techniques and greater mass transit availability in an attempt to maximize efficiency of the existing facility. This alternative does not constitute a use of the historic properties and does not require additional right-of-way acquisition. Typical TSM improvements include ridesharing, high-occupancy vehicle lanes, traffic signal timing optimization, and restriping of existing pavement. Improvements would be limited to within the existing right-of-way. Current mass transit options at the Harbor Bridge are:

- Park and ride service and a limited periodic route between Corpus Christi and Gregory and other northern suburbs.
- Shuttle service between downtown Corpus Christi, the Museum District, and Corpus Christi Beach.
- Seasonal Harbor Ferry service between downtown and Corpus Christi Beach.

As currently configured, shuttle bus and ferry services are specifically geared to tourists and visitors, rather than daily users of US 181 and the Harbor Bridge.

Similar to the Do Nothing alternative, this option only includes routine maintenance throughout the lifespan of the Harbor Bridge and does not correct the existing structural problems. The estimated cost of routine maintenance for the existing Harbor Bridge through 2086 would be \$53,436,797, representing the cost of ongoing routine maintenance in terms of 2012 net present value. The cost of implementing TSM improvements has not been quantified.

This alternative does not address the basic project needs and purposes. Although it would minimally reduce congestion, especially during certain times of the day, it does not meet the long-term maintenance and operability needs of the Harbor Bridge. The bridge will remain a fracture-critical structure and continue to deteriorate despite measures to improve traffic efficiency and reduce congestion.

This alternative leaves the existing bridges in place and, as a result, does not address existing safety risks and design deficiencies related to approach roadways and geometry, the degree of vertical slope, and lack of shoulders on the Harbor Bridge and its immediate approaches. TSM and mass transit would have little impact on cargo and commercial traffic that use the Harbor Bridge in association with activities at the Port of Corpus Christi. In addition, TSM and mass transit do not provide US 181 with the necessary improvements to serve as a reliable evacuation route in the event of a hurricane. This alternative is feasible, but for the same reasons as the Do Nothing Alternative discussed in section 1a, it is not prudent as it does not meet the stated needs and purposes of the project.

Bypass Alternatives

Alternative 2a: Leave in Place as Scenic Bypass or Monument

This avoidance alternative would involve construction of a replacement bridge on a new alignment west of the existing Harbor Bridge. The specific location of the replacement bridge would be selected from one of the replacement alternatives discussed below (Alternatives 5a –

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5d), based on further design and environmental studies. The existing Harbor Bridge and approaches would remain in place as a scenic overlook, open to limited vehicular or pedestrian traffic. US 181 through traffic would shift to the new roadway alignment and replacement bridge. Purchase of between 37 and 87 acres of additional right-of-way would be required for construction of the replacement bridge and realignment of the new approach roadway, depending on the specific location of the replacement bridge.

The level of ongoing maintenance under this alternative would include painting, basic structural repair, and periodic rehabilitation. Based on the 2012 cost analysis for extending the bridge's service life, the estimated cost of this alternative through 2086 would be at least \$947,521,000. This cost figure includes:

- \$340,266,000 for routine maintenance, periodic repainting and minor rehabilitation, and continued bridge inspection.
- \$600,000,000 for construction of a replacement bridge using the project's Green Alternative (Alternative 5c), the least expensive of the build alternatives.
- \$7,255,000 for construction of new bridges to replace the existing NRHP-eligible concrete bridges, as follows:
 - \$536,580 to replace Structure No. 16-178-0-0074-06-050
 - \$966,064 to replace Structure No. 16-178-0-0074-06-169
 - \$875,584 to replace Structure No. 16-178-0-0074-06-170
 - \$587,400 to replace Structure No. 16-178-0-0074-06-171
 - \$1,110,780 to replace Structure No. 16-178-0-0101-06-043
 - \$3,178,560 to replace Structure No. 16-178-0-0101-06-044

This alternative would preserve the Harbor Bridge. However, some or all of the adjacent NRHP-eligible bridges would be removed under this alternative to provide for grading of the new approaches and alterations to the approaches for the existing Harbor Bridge. The construction of a bypass replacement structure would require establishment of an additional intersection on US 181 on either side of the ship channel. At each intersection, the roadway would split to allow through-traffic access to the new bridge and an exit leading to the existing historic bridge. The additional intersections could introduce traffic conflicts on the US 181 limited-access freeway, to allow vehicular entry to and exit from the scenic bypass, requiring realignment of the existing approaches to the bridge. In addition, the replacement build alternatives would also use protected parkland, recreation areas, and historic properties elsewhere in the project limits. Therefore, Alternative 2a is considered a "use" alternative. For specific information on uses under each of the replacement build alternatives, see discussions in Alternatives 5a through 5d below.

From the perspective of US 181 vehicular traffic, this alternative would meet the project's primary needs and purposes. US 181 traffic would shift to a new bridge over the Corpus Christi Ship Channel, with new approach alignment. The new bridge would be constructed using materials and technologies to minimize corrosion potential, reduce maintenance costs, and prolong service life in the coastal saltwater environment. US 181 traffic would not travel over the existing fracture-critical structure. The new bridge and approaches would be designed in accordance with current design standards, remedying the geometric deficiencies and safety-related issues

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now present at the existing bridge and enabling use of US 181 as a reliable hurricane evacuation route. The bridge would have at least six travel lanes with shoulders and would be designed to meet standards for vertical grade, horizontal curvature, and ramp length and spacing.

Regarding the project's secondary objectives, this alternative would support regional economic opportunity through construction of a safer and more reliable bridge and approaches, allowing for more efficient conveyance of commuters, commercial traffic, and emergency evacuation. However, this alternative would not improve access for large cargo vessels to the Port of Corpus Christi's Inner Harbor, as the existing bridge would remain in place with its 138-foot vertical height restriction. In addition, this alternative would likely worsen local connectivity and traffic congestion by leaving the existing Harbor Bridge and approaches in place as a scenic overlook while also constructing additional freeway infrastructure on a new alignment.

While this alternative would address the project's needs and purposes from the standpoint of US 181 vehicular traffic, it would also result in unacceptable safety and operational problems. Vehicular live loads on the existing Harbor Bridge would be significantly reduced, lessening the need for extensive rehabilitation beyond activities completed during the 2010-2012 rehabilitation project. However, the existing Harbor Bridge would remain in place as a fracture-critical structure subject to corrosion and deterioration, with limited vehicular traffic as a scenic overlook. The bridge would also remain open to pedestrian traffic. During normal times, the pedestrian live loads would be easily accommodated by the bridge's load capacity. However, as a scenic bypass, the bridge would potentially attract large numbers of pedestrians for special events like Independence Day celebrations. The pedestrian load at these times could prohibitively exceed the bridge's live load capacity.

Under this alternative, one-time Federal funding for rehabilitation or maintenance of the existing Harbor Bridge would be limited to \$7,400,000, representing the estimated demolition cost of the existing structure. Following this project, the existing Harbor Bridge would no longer be under TxDOT's jurisdiction and would not be eligible for Federal funding for rehabilitation or replacement under the Highway Bridge Program. Therefore, funding for continued maintenance or rehabilitation of the historic bridge would require additional non-Federal funding from governmental or private sources. There is no indication that the City of Corpus Christi or other local organization would agree to accept responsibility for substantial ongoing maintenance or rehabilitation costs.

Without secured maintenance funding and given continued deterioration of the fracture-critical structure, the existing Harbor Bridge would pose a danger to vehicles and pedestrians using the bridge as a scenic overlook, to persons using the parking areas and ferry landing underneath the bridge's approach spans, and to marine traffic passing under the bridge. A bridge collapse or partial failure would essentially shut marine traffic to the Inner Harbor and its major refinery and industrial operations, with adverse economic consequences on a regional and national scale.

As noted above, to provide access to the Harbor Bridge as a scenic overlook, the existing approach roadway would need to be retained, and would require additional construction to tie into the new freeway alignment or local roadways. The retention of the existing Harbor Bridge and approaches, combined with construction of a new-alignment bridge with associated interchange and freeway improvements, would pose considerable engineering challenges and

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could be unachievable within existing TxDOT design standards. Even if feasible from an engineering standpoint, this alternative is not prudent as it would result in unacceptable safety and operational problems related to deterioration of the existing Harbor Bridge, additional construction and operational costs of extraordinary magnitude associated with tying in existing and new freeway alignments and traffic flow patterns, and would further exacerbate the perceived barrier between the CBD and established residential neighborhoods with minority and low-income populations.

The existing Harbor Bridge could also be left in place as a monument without vehicular or pedestrian access; however, this option is not reasonable and was not studied in detail. To prevent unauthorized access to the structure, the outermost approach spans would be removed or access would be blocked using fencing and bollards. The prestressed concrete beams on the approach spans are considered a historically significant feature of the bridge and their removal would result in an adverse effect to the bridge and use of the historic property. Since the bridge would no longer serve vehicular or pedestrian traffic and would largely be inaccessible, ongoing maintenance activities would be very limited or discontinued. The bridge would deteriorate at an increasing rate and would pose potential safety hazards to vessels entering the Inner Harbor and to pedestrians, visitors, and workers in the area under the approach spans, which is currently used as paved parking areas, a ferry landing, and an observation building, all accessible and in use by the public. Leaving the Harbor Bridge in place as a monument is not a reasonable alternative and, as a result, was not studied in detail and is not further addressed in this evaluation.

Alternative 2b: Upgrade Nearby Parallel Roadways

This alternative includes upgrading a nearby parallel roadway that meets the needs and purposes of the project. The existing Harbor Bridge crosses over the Corpus Christi Ship Channel at its mouth to Corpus Christi Bay. There are no nearby parallel roadways that could feasibly be upgraded to handle current or projected future US 181 traffic volumes. Navigation Boulevard provided vehicular and freight railroad service across the Ship Channel, until the removal of the Tule Lake Lift Bridge in 2008. No other roadways now cross the Ship Channel. The nearest parallel through route to the west is IH 37, which crosses the Nueces River about 19 miles to the west of Harbor Bridge. Corpus Christi Bay is located immediately east of the Harbor Bridge. Therefore, there are no parallel routes east of Harbor Bridge on the mainland. Due to the lack of nearby parallel roadways, this alternative is considered not reasonable and, as a result, was not studied in detail and is not further addressed in this evaluation.

Rehabilitation (Avoidance) Alternatives

Alternative 3: Continued Two-way Vehicular Traffic

This alternative is similar to the "Do Nothing" alternative but provides for more comprehensive maintenance and periodic rehabilitation of the bridge as needed to allow for continued two-way vehicular traffic. Recent rehabilitation projects, conducted in 2005 and in 2010-2012, addressed immediate structural needs and increased the operating load capacity of the bridge's truss spans. The periodic rehabilitation work will provide an estimated 15 to 20 years of continued serviceability, assuming intermediate spot painting as needed to limit corrosion. This alternative does not constitute a use of the historic Harbor Bridge, other nearby NRHP-eligible bridges, or other properties considered to be a use and is therefore considered an avoidance alternative.

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Under this alternative, more extensive rehabilitation would be undertaken to allow for continued vehicular use. Rehabilitation activities would include extensive repair or replacement of truss floorbeams, complete deck replacement, and replacement or supplemental collar bracing of prestressed concrete approach spans. To be considered an avoidance alternative, these rehabilitation activities would be conducted in a manner that avoids adverse effects to the bridge's engineering significance under Section 106 of the NHPA and therefore avoids use of the historic property. The estimated cost of this alternative would be \$401,430,000, representing the 2012 net present value for continued routine maintenance and inspection, periodic repainting and rehabilitation on a 15-year cycle, and full restoration on a 30-year cycle.

An avoidance alternative that includes extensive rehabilitation and ongoing maintenance for continued two-way traffic is feasible. However, this alternative does not address the basic needs and purposes of the project, and would introduce additional unacceptable operational problems to US 181 and surrounding transportation facilities, as noted below.

Although rehabilitation activities under this alternative would result in longer serviceability of the existing Harbor Bridge, this option does not address the bridge's long-term maintenance and operability issues. Despite efforts to repair or replace truss floorbeams, completely replace the deck, and replace or add supplemental collar bracing to prestressed concrete approach spans, the existing Harbor Bridge will remain a fracture-critical structure under this avoidance alternative. With steel main spans and major approach spans, the bridge would remain subject to recurring corrosion in the coastal saltwater environment, leading to ongoing maintenance and operability concerns. In addition, existing problems with roadway approach and ramp geometry, degree of vertical slope, and lack of shoulders are not addressed under this alternative. These issues include the steep five percent vertical slope, S-shaped curves at the bridge approaches, short entrance/exit ramps, and lack of shoulders on the bridge and approaches. This alternative does not provide US 181 with the improvements needed for its use as a reliable hurricane evacuation route nor does it address the safety risks posed by design deficiencies of the roadway on the bridge and along its approaches.

The rehabilitation for continued two-way traffic alternative does not address other project objectives. Current inadequacies related to connectivity to local roadway networks, congestion and perceived separation between adjoining neighborhoods are not alleviated under this option.

Another factor to consider under this option is the impact that partial or full closure of the bridge will have on surrounding communities and Corpus Christi suburbs. The intensive rehabilitation would require the bridge to be fully closed for a minimum of six months with the potential for longer closure if project delays take place. Such closure would remove the roadway from use as a hurricane evacuation route and could prove disastrous in the event of a hurricane during the closure. Full closure would also cause extensive travel disruptions to persons using the US 181 corridor between Corpus Christi and points north. The distance between downtown Corpus Christi and the northern suburb of Portland is 8.8 miles via US 181. With Harbor Bridge closure, the most direct detour routes would be 42.6 miles via Odem and Calallen, or 59.3 miles via Mustang Island and Aransas Pass. Both detour routes include two-lane roadways with much less traffic capacity than the volumes used on US 181, and the Mustang Island/Aransas Pass route includes the Port Aransas ferry across Packery Channel. The ferry service would not be able to handle the large traffic volumes or the heavier-load commercial traffic that currently use the Harbor Bridge.

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This alternative is feasible from an engineering standpoint. However, as discussed above, it is not prudent as it does not meet the project's stated needs and purposes, and would cause unacceptable operational problems through long-term full closure of the bridge on a major regional traffic artery and potential hurricane evacuation route.

Rehabilitation (Use) Alternatives

Alternative 4a: Continued Two-Way Vehicular Traffic

Similar to Alternative 3, this alternative would rehabilitate the Harbor Bridge for continued full vehicular service in both directions of traffic. However, this alternative would include a very extensive rehabilitation that would address other project needs through construction of a wider roadway section with shoulders, and replacement of concrete beam approach spans with realignment of approach roadways to provide longer approaches on a flatter grade. Unlike Alternative 3, the rehabilitation would entail substantial alterations to the bridge's character-defining features, including significant components of its superstructure and approaches, and would result in a use of the historic Harbor Bridge. This alternative is not feasible to construct and would essentially require full redesign and replacement of the bridge, given the bridge's tied arch and truss members on either side of the roadway. In addition, the extensive construction required for this alternative would result in partial or full closure of the bridge for an extended period of time, causing unacceptable operational problems for this major regional traffic artery and potential hurricane evacuation route, as described in Alternative 3 above. This option is not reasonable and was not studied in detail.

Alternative 4b: Continued Vehicular Traffic as Part of a One-Way Pair

This alternative consists of retaining the existing Harbor Bridge to serve northbound US 181 traffic and building a new structure just west of the existing bridge to serve southbound US 181 traffic. The existing Harbor Bridge would receive ongoing routine maintenance and periodic rehabilitation similar to Alternative 3. For purposes of this evaluation, it is assumed that the location of the new bridge and its approaches would use the Green Alternative (Alternative 5c), immediately adjacent to the current Harbor Bridge. This option would avoid a use of the Harbor Bridge. However, to taper the new approach alignment back into existing US 181 north of the Harbor Bridge and into the US 181/IH 37 interchange south of the Harbor Bridge, this alternative would result in a use of at least four NRHP-eligible bridges, through their removal: US 181 Northbound Ramp at US 181, Southbound US 181 Bridge at Belden Street, Southbound US 181 off-ramp at SS 544, and Northbound US 181 Bridge at SS 544. Depending on the exact design, this alternative could also result in a use of up to five additional NRHP-eligible properties: US 181 Bridge at Burleson Street, Northbound US 181 Ramp at SS 544, building at 725 Waco Street, building at 711 Waco Street, and the former SAU&G Railroad Depot at 1101 North Tanchua Street. This alternative would require at least 37 acres of additional right-of-way acquisition, with displacement of several warehouses and commercial buildings in addition to the historic properties noted above.

Based on the 2012 cost analysis for extending the bridge's service life, the estimated cost of this alternative through 2086 would be at least \$1,008,685,000. This cost figure includes:

- \$401,430,000 for routine maintenance and inspection of the existing Harbor Bridge, periodic repainting and rehabilitation on a 15-year cycle, and full restoration on a 30-year cycle.

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- \$600,000,000 for construction of a new southbound bridge using the project's Green Alternative (Alternative 5c), the least expensive of the build alternatives.
- \$7,255,000 for construction of new bridges to replace the existing NRHP-eligible concrete bridges, as follows:
 - \$536,580 to replace Structure No. 16-178-0-0074-06-050
 - \$966,064 to replace Structure No. 16-178-0-0074-06-169
 - \$875,584 to replace Structure No. 16-178-0-0074-06-170
 - \$587,400 to replace Structure No. 16-178-0-0074-06-171
 - \$1,110,780 to replace Structure No. 16-178-0-0101-06-043
 - \$3,178,560 to replace Structure No. 16-178-0-0101-06-044

Alternative 4b does not fully address the project's primary needs and purposes. The alternative would greatly reduce vehicular live loads on the existing Harbor Bridge with only three travel lanes. The presence of a parallel structure would enable full closure of the existing Harbor Bridge, if needed, to complete full deck and floorbeam replacement in the future. However, the bridge would remain a fracture-critical structure with ongoing corrosion and deterioration of bridge members. Maintenance costs will continue and may increase because of the structure's age and the continuous exposure of the steel bridge elements to the saltwater environment. Alternative 4b does not meet the long-term maintenance and operability needs of the bridge.

This alternative would address several safety and congestion issues resulting from the narrow roadway width. The existing Harbor Bridge would carry three 12-foot-wide travel lanes, with additional width available for shoulders and pedestrian sidewalks. The additional lane width and shoulders would address some of the current needs relating to safety and traffic congestion. The construction of the adjacent bridge and resulting shoulders would allow US 181 to be used as a reliable hurricane evacuation route. Depending on exact design, the approach roadways could be reconfigured to improve some of the existing deficiencies in ramp length and horizontal curvature. However, such reconfiguration could require additional right-of-way acquisition to improve roadway geometry while accommodating both the existing and new approach alignments. This alternative would not address the steep vertical slope for the current Harbor Bridge, which would still carry northbound US 181 traffic. In addition, this alternative would not address the inadequate connectivity to the local roadway network that results in congestion and a perceived separation between adjoining neighborhoods. Although this alternative is feasible, it does not meet the project needs and purposes regarding design deficiencies, safety issues, and long-term maintenance and operability.

Alternative 4c: Rehabilitation of the Bridge at a New Location

Under Alternative 4c, the existing Harbor Bridge would be rehabilitated for vehicular or pedestrian use at a new location. A replacement structure would be constructed on a new location just west of the existing bridge, using one of the replacement build alternatives discussed below (Alternatives 5a – 5d). The bridge's historically significant features include both the cantilever tied-arch truss unit and the prestressed concrete beam approach spans. The extreme length and height of the bridge significantly limit the possibility for feasible relocation of all or part of the bridge. It is highly unlikely that the truss and concrete beam spans could be moved and reassembled at a new location *in toto* as a single unit. Relocation would require disassembly of the structure into smaller units. Therefore, this alternative would result in a use of the historic bridge. Right-of-way acquisition would be required for the new structure and its approach roadways. For specific information on right-of-way acquisition and potential uses

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under each of the replacement build alternatives, see discussions in Alternatives 5a through 5d below.

Due to its design and monumental scale, the Harbor Bridge cannot feasibly be relocated in a manner that would retain the features and attributes that contribute to the bridge's engineering significance. Nonetheless, the bridge will be marketed for donation and reuse in accordance with Federal regulations, as specified at 23 CFR 144(n)(4). However, considering the substantial ongoing maintenance and operational costs inherent with the existing bridge, it is considered unlikely that a state agency, locality, or responsible private entity will enter into an agreement to maintain the bridge and its significant features and to assume all legal and financial responsibility for the bridge at a new location. Under this alternative, Federal funding for relocation would be limited to \$7,400,000, representing the estimated demolition cost of the structure. Preliminary estimates to transport and reassemble all or part of the Harbor Bridge at another location are difficult to quantify, as no bridge of comparable size has been disassembled, transported, and reassembled. It is projected that relocation would cost in the tens or hundreds of millions of dollars, depending on the exact portions of the bridge to be relocated and the distance of the new location. The bridge recipient would be responsible for any additional transportation costs, rehabilitation costs, site preparations, and continued maintenance.

For purposes of this evaluation, it is assumed that the location of the new bridge and its approaches would use the Green Alternative (Alternative 5c), immediately adjacent to the current Harbor Bridge. To taper the new approach alignment back into existing US 181 north of the Harbor Bridge and into the US 181/IH 37 interchange south of the Harbor Bridge, this alternative would result in a use of at least four NRHP-eligible bridges, through their removal: US 181 Northbound Ramp at US 181, Southbound US 181 Bridge at Belden Street, Southbound US 181 off-ramp at SS 544, and Northbound US 181 Bridge at SS 544. Depending on the exact design, this alternative could also result in a use of up to five additional NRHP-eligible properties: US 181 Bridge at Burleson Street, Northbound US 181 Ramp at SS 544, building at 725 Waco Street, building at 711 Waco Street; and the former SAU&G Railroad Depot at 1101 North Tanchua Street. This alternative would require at least 37 acres of additional right-of-way acquisition, with displacement of several warehouses and commercial buildings in addition to the historic properties noted above.

It should be noted that the additional NRHP-eligible bridges would also need to be marketed for donation and reuse. However, due to their heavy weight, composite decks, and method of construction, it is not realistically feasible to relocate these bridges and any required marketing would therefore be conducted in a streamlined manner.

The estimated cost of this alternative through 2086 would be at least \$657,255,000. This cost figure includes:

- \$50,000,000 as a lowest-end figure for relocation of a portion of the existing Harbor Bridge. It is likely that relocation costs would be significantly higher than this figure.
- \$600,000,000 for construction of a new bridge using the project's Green Alternative (Alternative 5c), the least expensive of the build alternatives.

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- \$7,255,000 for construction of new bridges to replace the existing NRHP-eligible concrete bridges, as follows:
 - \$536,580 to replace Structure No. 16-178-0-0074-06-050
 - \$966,064 to replace Structure No. 16-178-0-0074-06-169
 - \$875,584 to replace Structure No. 16-178-0-0074-06-170
 - \$587,400 to replace Structure No. 16-178-0-0074-06-171
 - \$1,110,780 to replace Structure No. 16-178-0-0101-06-043
 - \$3,178,560 to replace Structure No. 16-178-0-0101-06-044

Replacement Alternatives

Introduction

The replacement build alternative would remove the existing Harbor Bridge and its approaches and would construct a new replacement bridge over the Corpus Christi Ship Channel on new alignment west of the existing Harbor Bridge. This alternative would also construct roadway approaches to the replacement bridge on either side of the Ship Channel, and would build or reconstruct adjacent freeway segments and interchanges to accommodate vehicular traffic associated with the replacement bridge and the new US 181 freeway alignment. A specific design for the replacement structure has not yet been determined; however, earlier cost estimates assumed construction of a distinctive cable-stayed bridge. The existing bridge and approaches would be demolished following completion of the replacement structure. This alternative would also remove the six nearby NRHP-eligible bridges covered under this evaluation.

A range of replacement build alternatives have been considered as part of the project development and public involvement processes. Four preliminary build alternatives (known as the Blue, Green, Orange, and Red Alternatives) were initially developed, with two more alternatives (Tunnel and West Alternatives) added based on input from public scoping meetings.

Of the six replacement build alternatives, the Tunnel and Blue Alternatives were removed from further study during a screening process that evaluated the alternatives against measures of effectiveness established for each project purpose. Following is a brief description of each replacement build alternative:

Alternative 5a: Blue Alternative

The Blue Alternative would construct a bridge structure in a loop extending into Corpus Christi Bay. The existing Harbor Bridge and the six nearby NRHP-eligible bridges would be removed as part of this alternative, resulting in a use of these historic properties. The Blue Alternative alignment generally follows the existing alignment of US 181 to just north of Burleson Street. The alignment then veers east across Corpus Christi Bay, passing to the north of the USS Lexington museum. The alignment continues south across the bay and the ship channel, turning west and crossing Shoreline Drive at SS 544. The alignment then follows SS 544/IH 37 west to North Staples Street. The alternative screening process identified major problems regarding the Blue Alternative. The bridge structure would be located over water for more than 7,700 feet and would be more exposed in the event of a major hurricane. In addition, bridge columns extending into Corpus Christi Bay could gather storm-surge debris in the event of a hurricane, with potential for damage to the structure and the inoperability of the US 181 facility. The Blue Alternative was determined incapable of serving as a reliable, long-term hurricane evacuation route for the Corpus Christi area and would not be included in the State of Texas

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Hurricane Response Plan. The Blue Alternative would therefore not meet the stated need and purpose for the project and has been removed from further study.

Alternative 5b: Tunnel Alternative

The Tunnel Alternative would construct a subsurface tunnel to carry US 181 under the Corpus Christi Ship Channel. The tunnel would be located just west of the existing Harbor Bridge. The existing Harbor Bridge and the six nearby NRHP-eligible bridges would be removed as part of this alternative, resulting in a use of these historic properties. The Tunnel Alternative alignment follows the existing alignment of US 181 to just south of Burleson Street, where the north entrance to the tunnel would be located. The alignment then veers slightly to the west, paralleling the existing US 181 alignment. From the south tunnel entrance, the alignment then continues south on the west side of the existing US 181 to IH 37, then follows IH 37 to North Staples Street. The Tunnel Alternative also has problems associated with effectiveness as a hurricane evacuation route. While the tunnel would be designed to minimize flooding, storm-surge flooding of the tunnel structure would remain a possibility with dangerous consequences during hurricane evacuation and post-storm recovery efforts. The Tunnel Alternative was determined incapable of serving as a reliable, long-term hurricane evacuation route for the Corpus Christi area and would not be included in the State of Texas Hurricane Response Plan. The Tunnel Alternative would therefore not meet the stated need and purpose for the project and has been removed from further study.

Alternative 5c: Green Alternative

The Green Alternative would construct a replacement bridge just west of the existing Harbor Bridge. The replacement bridge would have a low-chord elevation of 207 feet and a main span length of 700 feet. The Green Alternative follows the existing alignment of US 181 to Burleson Street. The alignment then veers slightly to the west, crossing the Ship Channel just west of the existing Harbor Bridge and continuing on the west side of US 181 to IH 37. The alignment generally follows the existing alignment of IH 37 to the interchange with SH 286. The existing Harbor Bridge and the six nearby NRHP-eligible bridges would be removed under this alternative. Based on current design schematics, this alternative may also result in use of the following additional historic properties:

- Building at 725 Waco Street
- Building at 711 Waco Street;
- SAU&G (now Union Pacific) Railroad Depot at 1101 North Tancahua Street (*de minimis* use)
- Lovenskiold Park at 1600 Antelope Street
- Rincon Channel Observation Area Wetlands at 3110 East Causeway Boulevard (potentially *de minimis* use)
- Ben Garza Park at 1815 Howard Street (potentially *de minimis* use)

It should be noted that additional design changes may reduce the extent of use from these historic properties.

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This alternative would also include reconstruction of the IH 37/US 181 interchange and IH 37/SH 286 interchange to accommodate the new alignment and traffic flow patterns. The Green Alternative would require approximately 37 acres of additional right-of-way and would have an estimated construction cost of \$600 million, not including right-of-way acquisition, utility relocation, or any necessary mitigation.

Alternative 5d: Orange Alternative

The Orange Alternative would construct a replacement bridge just west of the existing Harbor Bridge. The replacement bridge would have a low-chord elevation of 210 feet and a main span length of 860 feet. The Orange Alternative follows the existing alignment of US 181 to Burleson Street. The alignment then veers slightly to the west, crossing the Ship Channel just west of the existing Harbor Bridge. The alignment then veers southwest to cross IH 37 at the existing IH 37/SH 286 interchange. The alignment then follows the existing SH 286 alignment south to Morgan Avenue. The existing Harbor Bridge and the six nearby NRHP-eligible bridges would be removed under this alternative. Based on current design schematics, this alternative may also result in use of the following additional Section historic properties:

- R. Galvan Building at 1624-1632 Agnes Street
- Navarro Place Housing Complex at 160 North 19th Street (potentially *de minimis* use)
- Hebrew Rest Cemetery at 1601 Laredo Street (*de minimis* use)
- T.C. Ayers Park at 1722 Winnebago Street
- Oveal Williams Senior Center at 1414 Martin Luther King Drive
- Lovenskiold Park at 1600 Antelope Street
- Rincon Channel Observation Area Wetlands at 3110 East Causeway Boulevard (potentially *de minimis* use)
- Ben Garza Park at 1815 Howard Street (potentially *de minimis* use)

It should be noted that additional design changes may reduce the extent of use from these historic properties.

This alternative would also include construction on roadway approaches to the bridge on either side of the Ship Channel, removal of the current IH 37/US 181 interchange, and reconstruction of the IH 37/SH 286 interchange to accommodate the new alignment and traffic flow patterns. The Orange Alternative would require approximately 87 acres of additional right-of-way and would have an estimated construction cost of \$850 million, not including right-of-way acquisition, utility relocation, or any necessary mitigation.

Alternative 5e: Red Alternative

The Red Alternative would construct a replacement bridge about 1,500 feet west of the existing Harbor Bridge. The replacement bridge would have a low-chord elevation of 216 feet and a

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main span length of 1,642 feet. The Red Alternative veers southwest from existing US 181 alignment just north of Burleson Street and crosses the Ship Channel about 1,500 feet west of existing US 181. The alignment then extends south to cross IH 37 at the existing IH 37/SH 286 interchange. The alignment then follows the existing SH 286 alignment south to Morgan Avenue. The existing Harbor Bridge and the six nearby NRHP-eligible bridges would be removed under this alternative. Based on current design schematics, this alternative may also result in use of the following additional historic properties:

- R. Galvan Building at 1624-1632 Agnes Street
- Navarro Place Housing Complex at 160 North 19th Street (potentially *de minimis* use)
- Hebrew Rest Cemetery at 1601 Laredo Street (*de minimis* use)
- T.C. Ayers Park at 1722 Winnebago Street
- Oveal Williams Senior Center at 1414 Martin Luther King Drive
- Lovenskiold Park at 1600 Antelope Street
- Rincon Channel Observation Area Wetlands at 3110 East Causeway Boulevard (potentially *de minimis* use)
- Ben Garza Park at 1815 Howard Street (potentially *de minimis* use)

It should be noted that additional design changes may reduce the extent of use from these historic properties.

This alternative would also include construction on roadway approaches to the bridge on either side of the Ship Channel, removal of the current IH 37/US 181 interchange, and reconstruction of the IH 37/SH 286 interchange to accommodate the new alignment and traffic flow patterns. The Red Alternative would require approximately 74 acres of additional right-of-way and would have an estimated construction cost of \$900 million, not including right-of-way acquisition, utility relocation, or any necessary mitigation.

Alternative 5f: West Alternative

The West Alternative would construct a replacement bridge about 3,500 feet west of the existing Harbor Bridge. The replacement bridge would have a low-chord elevation of 206 feet and a main span length of 1,000 feet. The West Alternative veers southwest from the existing US 181 alignment south of Beach Street, then turns to the west-southwest nearly parallel to the Ship Channel. The alternative turns south, crossing Navigation Boulevard and then crossing the Ship Channel about 0.65-mile west of the existing US 181 alignment. The West Alternative alignment then continues south, paralleling to the east the existing alignment of Nueces Bay Boulevard to IH 37. The alignment then follows existing IH 37 east to SH 286, then south along existing SH 286 alignment to a point between Comanche Street and Laredo Street. The existing Harbor Bridge and the six nearby NRHP-eligible bridges would be removed under this alternative. Based on current design schematics, this alternative may also result in use of the following additional historic properties:

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- Lovenskiold Park at 1600 Antelope Street
- Rincon Channel Observation Area Wetlands at 3110 East Causeway Boulevard (potentially *de minimis* use)
- Ben Garza Park at 1815 Howard Street (potentially *de minimis* use)

It should be noted that additional design changes may reduce the extent of use from these historic properties.

This alternative would also include construction on roadway approaches to the bridge on either side of the Ship Channel, removal of the current IH 37/US 181 interchange, construction of direct connectors at the IH 37/US 181 interchange, and reconstruction of the IH 37/SH 286 interchange to accommodate the new alignment and traffic flow patterns. The West Alternative would require approximately 80 acres of additional right-of-way and would have an estimated construction cost of \$700 million, not including right-of-way acquisition, utility relocation, or any necessary mitigation.

No feasible and prudent avoidance alternatives were identified through the alternatives analysis process discussed above. Four alternatives that use historic properties are feasible and prudent: Alternative 5c (Green Alternative), Alternative 5d (Orange Alternative), Alternative 5e (Red Alternative), and Alternative 5f (West Alternative). These four alternatives are being compared to determine which alternative would cause the least overall harm in light of the preservation purpose and intent of Section 4(f). The least overall harm comparison is based on factors that assess each alternative's:

- Net harm to Section 4(f) properties;
- Ability to meet the project's needs and purposes;
- Adverse impacts to other resources not protected by Section 4(f); and
- Substantial cost differences.

Regardless, all alternatives with the exception of the "No Build" alternatives will adversely affect the historic Corpus Christi Harbor Bridge and the six eligible associated post 1945 bridges.

Efforts to Avoid and Minimize Harm
Planning Efforts

Public Involvement

NEPA-related public involvement

TxDOT has undertaken a major environmental review and public involvement process for the Harbor Bridge project. These efforts are meant to solicit input from interested agencies and the public on a wide range of project alternatives. Since 2009, NEPA-related public involvement efforts have included:

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- Pre-scoping letters and conference calls with cooperating and participating agencies (25 Federal, state, tribal, regional, and local agencies). The Texas Historical Commission, as the Texas State Historic Preservation Officer (SHPO), is a participating agency for the project. The Historic Bridge Foundation was also included as an interested party for the project.
- Scoping meetings with cooperating and participating agencies, and the public.
- Development of a Coordination Plan to guide interaction between TxDOT and the FHWA with the public and other agencies.
- Updating of the Harbor Bridge project website and mailing list.
- Reestablishment of the Citizen's Advisory Committee (CAC) with representatives from neighborhoods, local organizations, advocacy groups, and commuters. The CAC met on different occasions between January and October 2012.
- Reestablishment of the Technical Advisory Committee (TAC) with representatives from local municipalities, civic organizations, professional groups, and elected officials. The TAC met on different occasions between January and October 2012.
- TxDOT held nine neighborhood meetings at locations in the project area between September and December 2012.
- Public meeting, combining NEPA and Section 106 public involvement, held at the Solomon Ortiz Center in Corpus Christi on December 4, 2012.

Future NEPA-related public involvement efforts will include:

- Continued updates to project website and mail-outs.
- Additional project scoping and informational meetings, to provide opportunities for review and comment on project alternatives.
- A Design Guideline Workshop to solicit community desires for the design of a potential new bridge.
- Additional one-on-one and small-group stakeholder meetings.

Section 106 public involvement

Additional Section 106 public involvement, focused on soliciting participation and input regarding the project's potential effects on historic properties, was initiated by TxDOT in late 2012. Section 106 public involvement efforts to date have included:

- Participation in the December 4, 2012, public meeting for the Harbor Bridge project:
 - Meeting notices on the project website and in local newspaper articles specifically highlighting TxDOT's desire to gain input from the public regarding historic resources.

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US 181 Corpus Christ Bridge Project, Nueces County, Corpus Christi District

- Inclusion of historic resources and Section 4(f) properties in TxDOT's staff presentation.
- Display map of historic properties in the Area of Potential Effect of the project's build alternatives.
- Display flowchart of the Section 106 process for meeting attendees.
- Opportunity to complete a Historic Resources Comment Sheet, available in English and Spanish.
- Historians from TxDOT, the Texas SHPO, and TxDOT consultant Mead & Hunt, Inc. were present at the meeting to answer questions and solicit input from meeting attendees.
- Inclusion of the final *Historic Resources Survey Report* (HRSR) for the Harbor Bridge Project on the project's website.
- Development of a Section 106 Public Involvement Plan, finalized in February 2013.
- TxDOT staff presentations to the Nueces County Historical Commission (CHC) and the Corpus Christi Landmarks Commission, in their capacity as a Certified Local Government.
- Compile list of potential Section 106 consulting parties.

Future Section 106 public involvement efforts will include:

- Solicit input and participation from interested organizations, community groups, and owners of directly affected historic properties, as Section 106 consulting parties.
- Invite representatives of the Nueces CHC and the Corpus Christi Landmarks Commission to participate in the project's CAC, TAC, and/or Design Guideline Workshop.

Design Modifications

TxDOT prepared Historic Bridge Team Reports for the Harbor Bridge and for six adjacent NRHP-eligible concrete bridges to examine possible non-build project alternatives. However, the prudent and feasible alternatives that meet the project's primary needs and secondary objectives would remove the Harbor Bridge and the six adjacent NRHP-eligible concrete bridges. Design modifications or alignment shifts would not result in changes to the removal of the bridges. Design modifications are instead geared towards avoidance or minimization of impacts to other Section 4(f) properties associated with the project. These efforts are further described in the Least Overall Harm Analysis document, under separate cover.

Mitigation for Adverse Effect

In accordance with CFR 800.6, TxDOT proposes to mitigate the above mentioned adverse effects, if marketing efforts fail to find an appropriate recipient for the bridge, with implementation of programmatic mitigation efforts under development with your agency and the Historic Bridge Foundation. Specifically, TxDOT requests HBF comment regarding the subject Corpus Christi Harbor Bridge. Original drawings and a construction notebook are in the possession of TxDOT historians. Through past discussions between TxDOT, THC and HBF it appears there is a desire

SECTION 106: DETERMINATION OF ADVERSE EFFECTS
US 181 Corpus Christi Bridge Project, Nueces County, Corpus Christi District

to find suitable overall mitigation in relation to the main bridge.

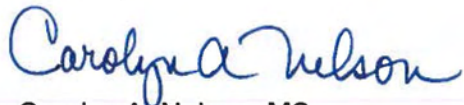
In relation to the six associated Post 45 bridges and in accordance with 36 CFR 800.14(e), the ACHP and FHWA are continuing a dialog in regard to programmatic mitigation for the neoprene pad Mid-20th Century Concrete and Steel Bridges. The recent program comment streamlines project delivery by waiving Section 106 consideration of effects on common mid-20th century bridges such as the six associated. The baseline analysis of such projects found that this class of bridges tends to lack distinctive treatments, reflect little value for preservation in place, and typically do not occur within or adjacent to historic districts. These bridge types are well-documented examples of standardized designs that lack individual distinction.

Determination of Effects

After applying the criteria of *Adverse Effects* as stipulated in 36 CFR 800.5, I have determined that the proposed action to replace the Corpus Christi Harbor Bridge and the six associated Post 45 bridges will constitute an adverse effect to this National Register eligible properties. Please sign in the space provided below indicating your concurrence with this finding of *adverse effect* and proposal to continue mutually agreeable mitigation.

We look forward to future consultation with your staff and hope to maintain a partnership that will foster effective and responsible solutions for improving transportation, safety and mobility in the state of Texas. Thank you for your cooperation in this federal review process. If you have any questions or comments concerning this project, please call me at (512) 416-2619.

Sincerely,



Carolyn A. Nelson, MS
Architectural Historian

Attachments

CONCUR ADVERSE EFFECTS WITH MITIGATION	
NAME: _____	DATE: _____
Historic Bridge Foundation	

Bcc: Corpus Christi District
ENV/PD
THC

Christopher Amy
Sonya Hernandez
Linda Henderson

SECTION 106: DETERMINATION OF *ADVERSE* EFFECTS
US 181 Corpus Christ Bridge Project, Nueces County, Corpus Christi District

ATTACHMENTS

From: Kitty Henderson [<mailto:kitty@historicbridgefoundation.com>]
Sent: Tuesday, June 11, 2013 10:45 AM
To: Carolyn Nelson
Subject: Harbor Bridge, Corpus Christi, Texas

Ms. Nelson

This email serves as an official comment from the Historic Bridge Foundation on above referenced project. The Historic Bridge Foundation concurs that the proposed action would be an adverse effect on the historic bridge.

Kitty Henderson
Executive Director
Historic Bridge Foundation
PO Box 66245
Austin, Texas 78766
512/407-8898
kitty@historicbridgefoundation.com

May 23, 2013

SECTION 106: DETERMINATION OF ELIGIBILITY AND EFFECTS

Nueces County (Corpus Christi District)
CSJ# 0101-06-095

RE: Corpus Christi Harbor Bridge Project-US 181 at Corpus Christi Ship Channel

Ms. Linda Henderson
History Programs
Texas Historical Commission
Austin, Texas 78711

Dear Ms. Henderson:

In accordance with 36 CFR 800.5 and the First Amended Programmatic Agreement for Cultural Resources, we are initiating Section 106 consultation for the above referenced project, which will be carried out with federal funds. This letter requests review and consultation concerning the determinations of eligibility findings to historic properties located within the project's Area of Potential Effects (APE) of the existing state and city right-of-way (ROW).

PROJECT DESCRIPTION:

The Texas Department of Transportation (TxDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to replace the existing Corpus Christi Harbor Bridge and improve the approach roadway along U.S. Highway (USH) 181 between Beach Avenue, north of the ship canal, and State Highway (SH) 286 at Morgan Avenue. The existing Harbor Bridge is a six-lane structure with no shoulders. The bridge currently has a 138-foot vertical clearance for moving water vessels within the Corpus Christi inner harbor. The federally assisted undertaking proposes to address several long-term concerns, including:

- **Maintaining the long-term operation of the US 181 crossing at the Ship Channel.** The Harbor Bridge is a fracture-critical bridge, meaning the key structural elements supporting the bridge are not supported by additional redundant elements and there is no second line of protection against collapse designed into the bridge. In addition, the bridge carries higher dead loads and live loads than it was originally designed for in 1959, and joints and connection members will continue to deteriorate and eventually require replacement, even with ongoing maintenance activities. Another major factor to overcome in maintaining the structure is corrosion, which results from the saltwater environment and requires routine cleaning and painting.
- **Address safety risks caused by design deficiencies.** The existing US 181 facility, including the Harbor Bridge, does not meet current FHWA and TxDOT roadway and bridge design standards. The facility's numerous design deficiencies contribute to deteriorating traffic conditions and higher than average accident rates. Specific deficiencies include the following:
 1. The existing US 181 approaches do not have shoulders, which contributes to increased levels of congestion from minor traffic crashes and breakdowns. In addition,

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B-203

the clearance between the travel lanes and the railing on the existing bridge does not meet current standards.

2. The design of the existing US 181 approaches creates a situation where vehicles are traveling downhill speeds and entering into sharp "S" curves at faster-than-posted speeds.

3. Certain ramp lengths do not provide sufficient acceleration or deceleration distances to meet current design standards.

4. The current configuration of southbound US 181, located just south of the Harbor Bridge, does not meet current design standards. Approaching downtown Corpus Christi from the north, motorists are presented with a three-decision breakpoint and the spacing between the three exit ramps does not comply with current design criteria.

5. US 181, including the Harbor Bridge, and Interstate Highway (IH) 37 within the project area are designated major hurricane evacuation routes (TxDOT 2011). US 181 is the primary evacuation route for San Patricio County and an alternate route to IH 37 for the city of Corpus Christi. A major evacuation would use the Harbor Bridge; without addressing design deficiencies, the risk of US 181 becoming unnecessarily congested during an emergency hurricane evacuation increases.

In order to address these issues, TxDOT proposes to replace the existing Harbor Bridge with a new six-lane divided structure with 4- to 10-foot inside shoulders and 6- to 10-foot outside shoulders. The vertical clearance for the bridge will also be increased in order to facilitate movement by larger vessels in and out of the inner harbor. The new structure and associated geometric changes will require realignment of approach roadways. Based on public involvement efforts and FHWA oversight, four alternative alignments are currently proposed as illustrated on the maps in Appendix A. The proposed project length is approximately 3.0 to 4.8 miles, depending on the proposed alternative. Below is a brief overview of each alternative:

1. Red Alternative – Begins at the interchange between US 181 and Beach Avenue, north of the ship channel, then extends west of US 181, just north of Burleson Street, and crosses the ship channel about 1,500 feet west of existing US 181. The roadway would then extend through TC Ayers Park where it crosses IH 37, and follows SH 286 to Morgan Avenue.

2. Orange Alternative – Begins at the interchange between US 181 and Beach Avenue, north of the ship channel, then extends west of US 181 at Burleson Street, and crosses the ship channel immediately west of existing US 181. It then veers west and extends through TC Ayers Park, where it crosses IH 37 and follows SH 286 to Morgan Avenue.

3. Green Alternative – Generally begins at Beach Avenue on US 181 and follows the existing alignment of US 181, south of Burleson Street, then veers immediately to the west of existing US 181 to IH 37 and follows the existing alignment of IH 37 to North Staples Street.

4. West Alternative – Begins to the north of Beach Avenue, near Sunset Lake, and extends west of existing US 181 across Nueces Bay, continuing south across the Port of Corpus Christi dredge spoil storage area, veers south across the Corpus Christi ship channel, and then continues south along Nueces Bay Boulevard to IH 37.

PUBLIC INVOLVEMENT ACTIVITIES:

Regulations of the Advisory Council on Historic Preservation (36 CFR Part 800) mandate public participation in projects that use federal funds, permits and/or licenses. An important part of the Public Involvement process includes obtaining community feedback on project findings related to alternatives and their associated construction activities. The public involvement process is a good faith effort to identify and to involve stakeholders to ensure that public concerns and comments are taken into account during the planning process. Consulting parties are individuals or organizations that typically include, but are not limited to, the State Historic Preservation Officer (SHPO) -- designated as the Texas Historical Commission -- local governments, and property owners that may be affected as a result of the proposed project. Several public involvement meetings were held from 2006 to December 2012; with SHPO in attendance at the December 2012 meeting.

Citizen and Technical Advisory Committees (CAC & TAC) are being formed to begin this summer and efforts were made to include community historic preservation members such as architect John Wright (former Texas Historical Commission State Board member). TxDOT also implemented a Public Involvement Plan (PIP) for Historic Resources.

CONSULTING PARTY ACTIVITIES:

Several groups were identified or granted consulting party status for this proposed project as follows:

- Corpus Christi Landmarks Commission-the acting Certified Local Government (CLG)
- Nueces County Historical Commission (NCHC)
- Historic Bridge Foundation (HBF)

A TxDOT historian and Corpus Christi Environmental staff gave presentations at each of the first two above group's monthly meetings and presented copies of the *Historic Resources Survey Report-Corpus Christi Harbor Bridge Reconnaissance Survey, Corpus Christi, Nueces County, Texas* in December 2012 and February 2013. In addition a TxDOT historian requested comment through multiple correspondences. No written comments were provided to TxDOT at this time for the December 2012 report from the CLG.

In addition, an intensive study was conducted in April 2013 to re-evaluate the eligibility of the Leopard Street Commercial District after the initial December 2012 reconnaissance level survey. The intensive survey recommended that there is no historic district within the APE, but two historic properties remain individually recommended **eligible** to the NRHP. These findings were also shared via mail April 12, 2013 with both above consulting parties and include personal follow-up calls to both Anita Eisenhauer, Nueces County Historical Commission Chair and Andrew Dimas, City Planner and liaison for the Corpus Christi Landmarks Commission on May 17, 2013. No comments have been offered in person or in writing from the CLG. Leopard Street property owners were also informed of the change in eligibility findings April 23, 2013.

One additional consulting party, the HBF, was sent two letters on April 23, 2013 and May 17, 2013. Informal conversation with Kitty Henderson, HBF Executive Director, recognizes the adverse effects to the historic bridges and indicates an interest in helping with ideas for appropriate mitigation for the Corpus Christi Harbor Bridge as part of the Post-1945 bridge programmatic mitigation. THC's review is being done concurrently with HBF and any comments will be forwarded immediately.

On April 12, 2013, both the CLG and CHC were consulted a second time regarding a re-evaluation of the Leopard Street Commercial Historic District. No comments were offered from the CLG. An email from NCHC Chair and representative, Anita Eisenhauer, on May 21, 2013 indicated that the NCHC concurred with TxDOT findings of *no historic district present in the APE*.

EFFORTS TO IDENTIFY HISTORIC PROPERTIES

Background research in the area of potential effects (APE) was conducted at the Texas Historical Commission's *Texas Historic Sites Atlas* to identify properties listed in the National Register of Historic Places (NRHP), and designated as State Archeological Landmarks (SAL) and Recorded Texas Historic Landmarks (RTHL). Official Texas Historical Markers (OTHM) were also identified in this process. A field survey followed to identify properties eligible to the NRHP in the APE. The results of this survey are found in the *Historic Resources Survey Report-Corpus Christi Harbor Bridge Reconnaissance Survey, Corpus Christi, Nueces County, Texas-November 2012* (previously provided to the THC on March 21, 2013).

Area of Potential Effects

Based on consultation between TxDOT and the THC, the APE within each alternative is 150 feet beyond the proposed right-of-way along existing roadway corridors and 300 feet beyond the proposed right-of-way for new location alignments and the multilevel interchanges at IH 37 at SH 286 and/or IH 37 at Nueces Bay Boulevard, depending on the alternative.

Previously Identified Historic Resources

The survey's background research uncovered the following previously identified sites, districts and objects in the APE (see a more detailed list starting on page 5 of the survey):

- Two NRHP listed historic properties:
 - Resource #385, Broadway Bluff Improvement
 - Resource # 130, Nueces County Courthouse (also designated as a SAL & RTHL)
- Two SAL designated properties:
 - Resource #118, Old Bayview Cemetery
 - Resource #130, Nueces County Courthouse
- One Recorded Texas Historic Landmark:
 - Resource #130, Nueces County Courthouse,
 - Resource #43, Centennial Marker-Nueces County
- Nine OTHMs commemorating
 - Explosion of the Steamship Dayton
 - Hebrew Rest Cemetery
 - Kelsey Memorial Methodist church
 - Lawrence House
 - Nueces County Courthouse
 - Old Bayview Cemetery
 - Port of Corpus Christi
 - Solomon M. Coles
 - Thomas S. Parker

November 2012 Reconnaissance Survey Recommendations

The November 2012 reconnaissance survey identified 851 properties in the APE. An inventory chart of the surveyed properties is included in Appendix C of the survey. A table listing the number of surveyed Resources by Alternative is located on page 27 of the survey. While most of the sites are residential, the total also includes governmental, commercial, recreational,

commemorative and educational properties, as well as funerary and transportation related properties.

TxDOT concurs with the survey recommendations that 25 were listed or previously determined eligible for listing in the NRHP, and 20 were determined individually eligible for the NRHP in the December 2012 survey.

However, after additional intensive research in April 2013, TxDOT historians determine the Leopard Street Commercial Historic District does not constitute an historic district. The findings are discussed in the report; *Re-Evaluation of Proposed Leopard Street Historic District for Individual Section 4(f) Evaluation* (previously provided to the THC on April 25, 2013).

May 2013 Intensive Survey Recommendations

During an intensive investigation regarding potential Section 4(f) impacts to the Leopard Street Commercial Historic District, TxDOT historians re-evaluated the recommendation in the December 2012 reconnaissance level survey, which included 14 contributing resources. The re-evaluation included additional buildings outside the previous APE and evaluation. The re-evaluation recommends the area as a whole is **not eligible or historic district**. However, the two following properties are recommended historic as individually **eligible** and TxDOT agrees:

- Resource #379: A c 1928 two part commercial block building currently Alamo Bail Bonds,
- 1001 Leopard (outside the APE, but included in Table 7, Pg 41 of the December 2012 survey): Braslau's Furniture Store a 1938/1957/1964 two-part commercial block furniture store.

May 2013 Design Change

During Public Meetings with the City of Corpus Christi a request was made to minimize the five-level interchange at the I37 and SH 286 Interchange. The TxDOT Corpus Christi district conducted further engineering studies and found an engineering solution that no longer requires a five-level interchange as the original December 2012 survey. Lowering the interchange shortens the distance needed to the southern terminus on SH 386 completely avoiding of the Galvan Building, Hebrew Cemetery and Navarro Public Housing Complex. A copy of the draft change is attached in Appendix A.

DETERMINATION OF EFFECTS (Direct, Indirect & Cumulative) TO HISTORIC PROPERTIES

TxDOT historians applied the Criteria of Effect to each of the proposed alternatives to NRHP eligible resource Nos. 43, 118, 124, 130, 281, 316, 379, 385, 386, 455, 472 and 474 determine that the proposed undertaking will have **no adverse effect** on the historical associations and architectural features for which these properties were found to be significant.

Depending on the alternative, construction activities for the Harbor Bridge Project are within the current ROW, require ROW for new alignment, or require ROW for alignment changes. Comments on effects to historic properties to the proposed improvements are provided below with the potential alignment noted. Additional information is provided in the December 2012 survey's inventory charts and individual resource forms.

INDIVIDUAL NRHP HISTORIC PROPERTIES- NO DIRECT IMPACTS, NO ADVERSE EFFECT

NRHP eligible properties	NRHP Status	Alternative/Alignment	Proposed Construction Activities	Effects/Comments
No. 43 S Side of ship Channel	Elig. Criteria Consideration F	All alignments/alternatives	No impacts to Centennial Marker	No adverse effect
No. 118 Old Bayview Cemetery	Elig. Criteria Consideration D	Green/Orange	No work abutting this location.	No adverse effect;
No. 124 Solomon Coles HS, 924 Padre St	Elig. A Education and Ethnic Heritage	Red/Orange	No work abutting this location.	No adverse effect;
No. 130 Nueces Co Courthouse, 1110 N Mesquite St	Elig. C	Green/Orange/Red/West	Removal of bridges may constitute a net benefit.	No adverse effect;
No. 281 - DN Leathers, 1001 Coke St & 1921 Winnebago	Elig. A Community Development & Social History. C Architecture	Red/Orange	No work abutting this location.	No adverse effect;
No. 316 - 1414 Leopard Street	Elig. C	Green/Orange/Red	No work abutting this location.	No adverse effect;
No. 379 - 1110- Leopard St	Elig. A-Ethnic Heritage & Commerce	Green	No direct impacts.	No adverse effect
No. 385 - Broadway Bluff Improvement	Elig. C	Green	No work abutting this location.	No adverse effect;
No.386 - Somico Bldg 807 Upper Broadway	Elig. C	Green	No work abutting this location.	No adverse effect
No. 455 - Navarro Place Housing Complex 160 N 19 th St	Elig. A Community Development & Social History. C Architecture	Red/Orange	No work abutting this location.	No adverse effect

Corpus Christi Harbor Bridge Project
CSJ# 0101-06-095

No. 472 – Hebrew Rest Cemetery 1601 Laredo St	Elig. Criteria Consideration D	Green/Orange	No work abutting this location.	No adverse effect
No. 474 – 1624-1632 Agnes St	Elig. A- Entertainment/Recreatio n Ethnic Heritage	Red/Orange	No work abutting this location.	No adverse effect

The following historic properties will be impacted as a result of this proposed project with the alignments noted as follows:

INDIVIDUAL NRHP HISTORIC PROPERTIES- DIRECT IMPACTS

NRHP eligible properties	NRHP Status	Alternative/Alignment	Proposed Construction Activities	Effects/Comments
No. 8 – US 181 over Burleson Street (NBI# 16178001016044)	Elig. C Neoprene pads	Green/Orange/Red/West	Removal	Adverse effect
No. 14 US 181 NB Frontage Rd (NBI# 16178001016043)	Elig. C Neoprene pads	Green/Orange/Red/West	Removal	Adverse effect
No. 39 – US 181 over the Corpus Christi Ship Channel (NBI# 16178001016041)	Elig. C	Green/Orange/Red/West	Removal	Adverse effect
No. 113 – US SB at Belden St (NBI# 161780007406050)	Elig. C Neoprene pads	Green/Orange/Red/West	Removal	Adverse effect
No. 117 SA, U & G Depot	Elig. C	Green	ROW needed from parking area	No adverse effect/Intent to pursue De Minimis
No. 125 US 181 SB Off Ramp @ SS 544 (NBI# 161780007406171)	Elig. A 3 & 4 level interchange	Green/Orange/Red/West	Removal	Adverse effect
No. 133 US 181 NB Off Ramp @ SS 544 (NBI# 161780007406169)	Elig. A 3 & 4 level interchange	Green/Orange/Red/West	Removal	Adverse effect
No. 134 US 181 NB Off Ramp @ SS 544 (NBI# 161780007406169)	Elig. A 3 & 4 level interchange	Green/Orange/Red/West	Removal	Adverse effect

TxDOT Historians determined that the proposed action will not have no other reasonably foreseeable adverse effects that may occur later in time, be farther removed in distance, or be cumulative.

Efforts to Minimize Harm and Mitigation

In accordance with CFR 800.6, TxDOT proposes to mitigate the above mentioned adverse effects with implementation of programmatic mitigation efforts under development with your agency and the Historic Bridge Foundation for the Post-1945 bridges. TxDOT would appreciate THC consultation to share ideas for appropriate mitigation efforts.

CONCLUSION

In accordance with 36 CFR 800 and the Programmatic Agreement for Transportation Undertakings, we hereby request your signed concurrence with these determinations of eligibility and effects within 30 days of your receipt of this letter. Consulting parties are simultaneously reviewing this proposed project and all comments will be forwarded to you immediately upon receipt. *Any design changes to this project will require re-coordination with your agency and the consulting parties.* If you have any questions of comments regarding this project, please contact me at 512-416-2555

Sincerely,

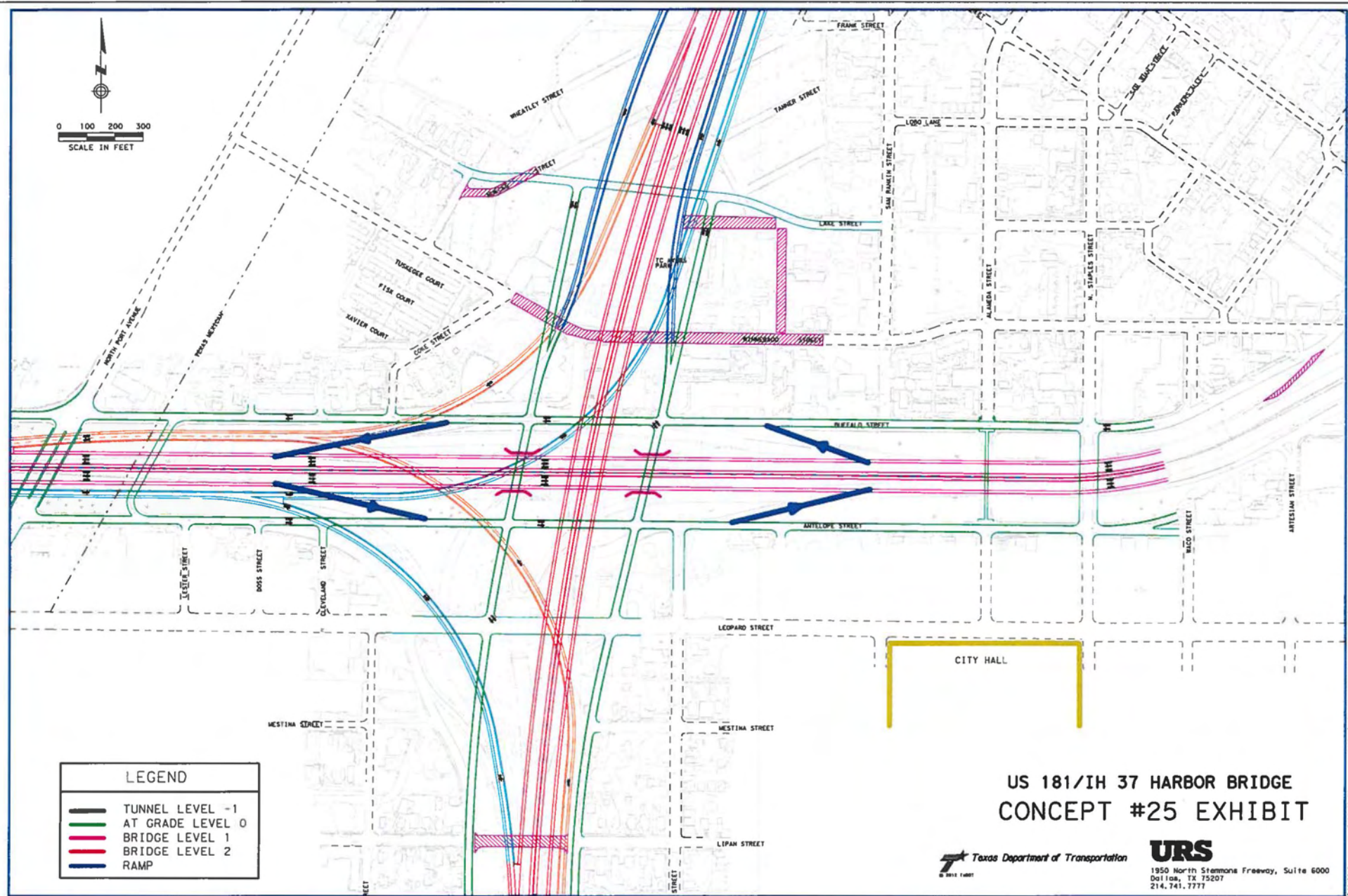


Carolyn A. Nelson, MS
Architectural Historian
Environmental Affairs Division

CONCUR Harbor Bridge Project CSJ: 0101-06-095	
■ DETERMINATIONS OF ELIGIBILITY FOR HISTORIC PROPERTIES ■ EFFECTS TO HISTORIC PROPERTIES	
NAME: _____ for State Historic Preservation Officer	DATE: _____

Attachments:

Exhibit A: Schematic Plan for Design Change at I37/SH286 Interchange



TEXAS HISTORICAL COMMISSION

real places telling real stories

6 June 2013

Carolyn Nelson
Environmental Affairs Division
Texas Department of Transportation
125 E. 11th Street
Austin, Texas 78701-2483

*Re: Project review under Section 106 of the National Historic Preservation Act of 1966
Corpus Christi Harbor Bridge Project—US 181 at Corpus Christi Ship Channel, Nueces County, Texas
(FHWA/TxDOT CSJ # 0101-06-095)*

Dear Mrs. Nelson,

Thank you for submitting information for the above-referenced project. You have provided a survey of properties within the Area of Potential Effect (APE) for the project alternatives under consideration, a re-evaluation of the Leopard Street area, and a letter with your recommendations and the results of your conversations with local consulting parties, the latter of which we received on May 24. This letter serves as official comment from Texas' State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC).

THC staff led by Linda Henderson reviewed the materials. As discussed with you earlier this week, THC concurs with your findings of eligibility with the exception of the potential for a commercial historic district in the vicinity of Leopard Street, which we find to be eligible for listing in the National Register of Historic Places (NRHP) under Criterion A at the local level, with the following properties being considered contributing: 709 Waco, 1122 Leopard, 1116-1120 Leopard, 1110 Leopard, 1102 Leopard, 1016 Leopard*, 1001 Leopard*, 1019-1021 Leopard, 1101 Leopard, 1117-1129 Leopard, 1023 Mestina, 1000 block Mestina*, 615 Waco, and 617 Waco. Attached, please find a table indicating the findings presented in the two surveys you provided, as well as our recommendations. *In addition to the eligible district, we find that three properties are individually eligible for listing (with 1000 block Mestina included with 1001 Leopard).

We concur with your determinations for the project's effects to historic properties. Because you had determined Leopard Street to be not eligible as a district and therefore did not make recommendations as to the project's effects to it, we request an addendum with your determinations of effect specific to those resources. We also agree with your proposed mitigation for adverse effects to the NRHP-eligible bridges, which will be carried out under broader programmatic mitigation for post-World War II bridges our offices are currently developing with Federal Highway Administration, and the Historic Bridge Foundation.

Thank you for your ongoing coordination with us on this project and for helping to identify and protect the state's irreplaceable historic resources. Please contact us with any questions: linda.henderson@thc.state.tx.us or 512/463-5851.

Sincerely,



Linda Henderson, Historian

For:

Mark Wolfe, State Historic Preservation Officer

Cc: Anita Eisenhower, Chair, Nueces County Historical Commission
Andrew Dimas, City of Corpus Christi, Certified Local Government Program



Response to Corpus Christi Harbor Bridge survey project and evaluation of potential Leopard Street Historic District

Resource No.	Address	Within APE	Contributing to a District?			NRHP Eligible	Date	Name of Building
			M&H	LK	THC	Individual		
366	725 Waco	Y	C	NC	NC	N	c. 1930	Unknown
367	711 Waco	Y	C	NC	NC	N	c. 1940	La India Bakery
373	709 Waco	Y	C	C	C	N	c. 1928	Unknown
377	1122 Leopard	Y	C	NC	C	N	1928, 1931	Henry Grossman Dept Store
378	1116-1120 Leopard	Y	C	NC	C	N	c. 1928	Unknown
379	1110 Leopard	Y	C	C	C	Y	c. 1928	Unknown
380	1102 Leopard	Y	C	NC	C	N	1926	Sagarino Building
381	1016 Leopard	Y	C	C	C	Y*	1927	Melba Theater
None	1024 Leopard	Y	NC	NC	NC	N	c. 1928	rental property owned by Grossman Bros
None	1001 Leopard	N	NC	C	C	Y	1938, 1957, 1964	Braslau's Furniture Store
None	1019-1021 Leopard	N	NC	C	C	N	1956	Rental property owned by Braslau
None	1101 Leopard	N	C	NC	C	N	C. 1935	Unknown
None	1117-1129	N	C	NC	C	N	1929	Aztec Building
None	1023 Mestina	N	C	NC	C	N	c. 1925	Goltzman Building
None	1000 block Mestina	N	C	included as part of 1001 Leopard	C	see 1001 Leopard	1952	Attached to Braslau's
None	615 Waco	N	C	C	C	N	c. 1922	Unknown
None	617 Waco	N	C	C	C	N	c. 1922	Unknown
Not listed	1119 Antelope	Y	Not included	NC	NC	N	c. 2000	
Not listed	1115 Antelope	Y	NC	NC	NC	N	1954	Solis Furniture Store
Not listed	1115-rear Antelope	Y	Not included	NC	NC	N	1954	Warehouse for Solis Furniture Store
		totals	14	8	14	3		
			out of 20	out of 20	out of 20			

June 6, 2013

Linda Henderson
P.O. Box 12276
Austin, TX 78711-2276

Dear Ms. Henderson:

RE: CSJ#0101-06-095

Thank you for your quick response. This letter serves as a response to your letter dated today June 6, 2013 and to provide the following information for THC records regarding changes that have occurred since we started consultation efforts.

- Several of the buildings determined as eligible and contributing to the Leopard Street Commercial Historic District in your June 6, 2013 letter were demolished by the City of Corpus Christi.
 - As of yesterday 1019-1021 Leopard was demolished,
 - as of May 6, 2013 the following properties were demolished-1117-1129 Leopard, 1101 Leopard, 615 Waco and 617 Waco.
 - In addition the following two properties are scheduled to be demolished by August 2013-1001 Leopard and the 1000 block of Mestina.
- With THC's findings of contributing and non-contributing buildings ten buildings remain 50%, of the district, which two properties would be discontinuous (1001 Leopard and the 1000 block of Mestina) due to the above demolitions and not appropriate to National Park Service Standards.
- Of the three THC determined individually eligible properties, TxDOT would like to provide the following information for your records:
 - 1016 Leopard is in a ruinous state in which the roof has caved in and structural cracks in the façade are highly questionable to Secretary of the Interior Standards according to a phone conversation with Andrew Dimas- Corpus Christi City Planner on April 16, 2013.
 - 1000 block of Mestina Street is currently awaiting demolition by August 2013. Due to the discontinuous nature created by the already demolished properties and that they were not in the original APE. This property will not be addressed.
- Seven properties remain solely on the north side of Leopard (1016-1122) and 709 Waco. Due to demolitions these eight properties do not make up an eligible historic district because they cannot convey their historic significance without the demolished buildings across from them that your office determined as contributing.

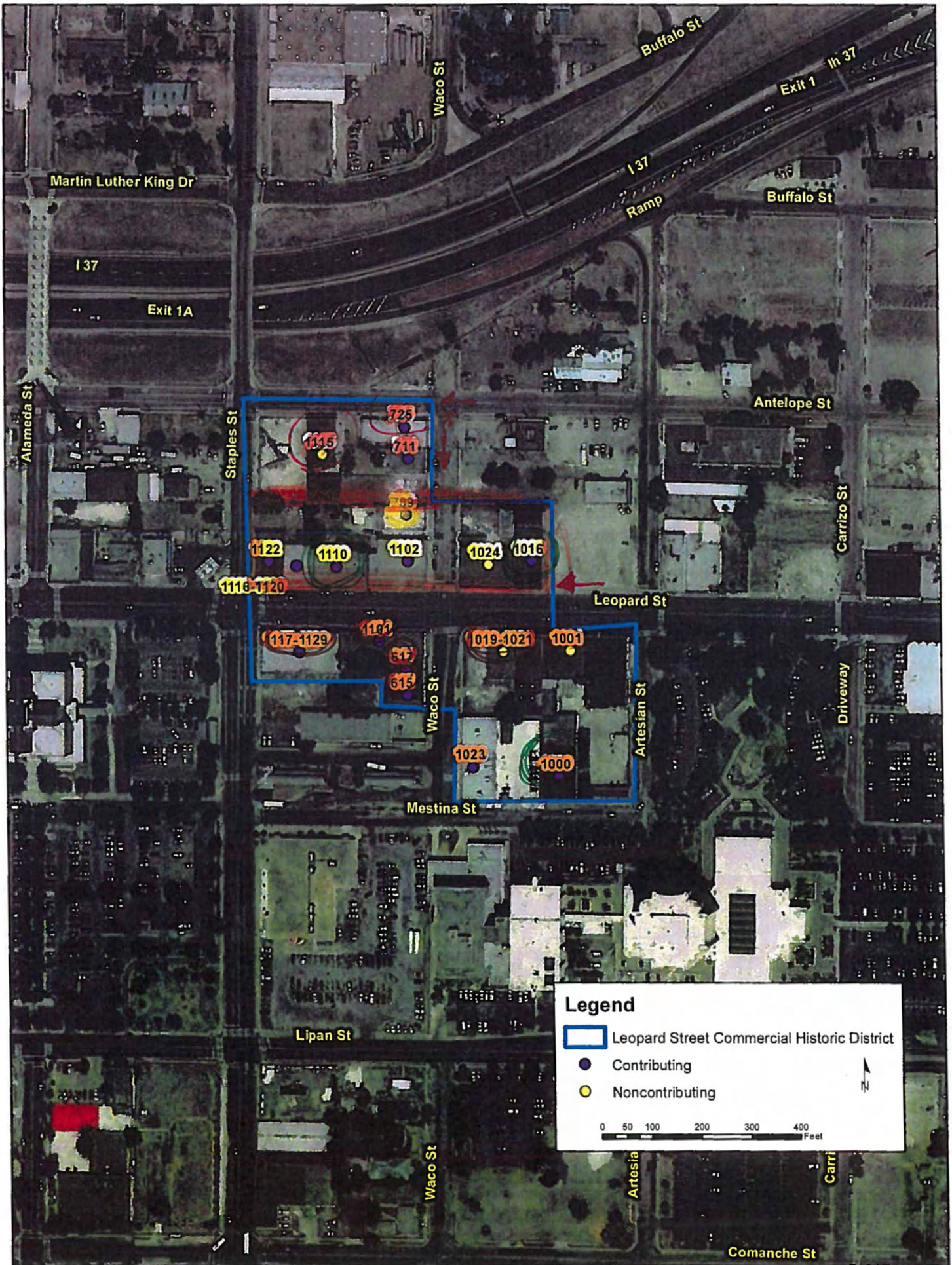
- Of the two individually eligible buildings your office determined eligible this proposed project will not cause an adverse effect to 1016 Leopard or 1110 Leopard. These two properties face south and away from the proposed project area, there will be no elevation changes at this location or the interchange due to the design changes discussed in our previous consultation.

We appreciate your time and visit to discuss this proposed project. Please feel free to call me at 512-416-2555 if you have any questions or need additional information.

Sincerely,

Carolyn A Nelson

CONCUR NO ADVERSE EFFECT ELIGIBLE HISTORIC PROPERTY	
NAME: <i>Mark Wolfe</i>	DATE: <i>6 June 2013</i>
<i>for</i> Mark Wolfe, State Historic Preservation Officer	





U.S. Department
of Transportation
**Federal Highway
Administration**

FEDERAL HIGHWAY ADMINISTRATION
300 EAST 8TH STREET, RM 826
AUSTIN, TEXAS 78701



TEXAS DEPARTMENT OF TRANSPORTATION
125 E. 11th STREET
AUSTIN, TEXAS 78701-2483

June 18, 2013

Ms. Teri Ficken, Public Relations Chairperson
Corpus Christi Area Heritage Society
202 Ghent Place
Portland, TX 78374

RE: CSJ: 0101-06-095; Harbor Bridge and US 181, Bridge Replacement and Roadway
Improvements, Four Alternatives Proposed for the Project Location, City of Corpus Christi;
Nueces County, Corpus Christi District

Dear Ms. Ficken:

The above referenced transportation project is being considered for construction by the Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT). Environmental studies are in the process of being conducted for this project. The project is located in an area that is of interest to you. The purpose of this letter is to contact you in order to consult with you in compliance with Section 106 of the National Historic Preservation Act (NHPA).

INTRODUCTION

The proposed project would replace the existing Harbor Bridge and re-route sections of United States Highway (US) 181, a six-lane divided highway in Corpus Christi, Nueces County, Texas. Harbor Bridge spans the Corpus Christi Ship Channel (CCSC) and carries US 181. As part of the planning process, four possible highway routes and locations for a new bridge are being considered. The enclosed map identifies the proposed alternatives (Green, Orange, Red, West) (see Figure 1). A preferred route has not yet been selected.

The alignments are in an urbanized and industrial setting that has been impacted by development that includes residential housing, the CCSC, commercial and industrial infrastructure, and shoreline restoration. In addition to the effects of development, the project

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area has been subjected to the impacts of weather and coastal erosion. As part of the planning process prior to construction, TxDOT shall conduct archeological investigations to evaluate the level of disturbance along the four designated alternatives and assess the probability for the presence of significant cultural resources, prehistoric or historic-age archeological remains, within the project area. The APE for this study would be the construction footprint based on schematics and plans currently available for each of the proposed alternatives. The study area would include a 1.0-kilometer (0.62-mile) range around the alternative alignments for cultural resources background research. A map for each of the four proposed alternatives is included with this letter.

In the following paragraphs, a project description is presented for each alternative, which includes existing and proposed right of way (ROW), permanent and temporary easements, utility relocations, and project-specific locations (PSLs).

The estimated depths of impact are typical for each alignment. The estimated depths of impact for a roadway would be less than 3 feet below surface. Sidewalks and shared use paths would be typically less than 2 feet below surface. Drainage systems and underground utility relocations would be typically less than 7 feet below surface. The deepest impacts are associated with drilled shafts for bridge support piers. These disturbances are in localized areas where the shafts are drilled, typically less than 5 feet in diameter and extending to solid substrate, a depth that may exceed 50 feet below surface.

GREEN ALTERNATIVE

The Green Alternative would begin at Beach Avenue on US 181 and follow the existing alignment of US 181 south to Burleson Street (see Figure 2). The alignment would then veer slightly to the west of the existing Harbor Bridge and cross the CCSC, continue on the west side of existing US 181 to Interstate Highway (IH) 37, and follow the existing alignment of IH 37 to the interchange with the Crosstown Expressway [alternately known as State Highway (SH) 286]. The location of the new bridge would be slightly offset to the west of the existing bridge.

The Green Alternative would have three 12-foot-wide main lanes in each direction with a median barrier and 12-foot-wide inside and 10-foot-wide outside shoulders. This alternative would also include a 10-foot-wide shared use path separated from the main lanes by a 2-foot-wide concrete barrier. The shared use path would extend from Carancahua Street on the south to Gulf Spray Avenue on the north. Two-lane, one-way frontage roads in each direction would also be included north of the CCSC between Beach Avenue and Breakwater Avenue. The ROW width for this alternative varies from 228 to 459 feet.

Substantive changes in access are not proposed relative to the current condition of the interchange, although certain points of access to and from IH 37 would be modified. Other changes in access are proposed along US 181 both north and south of the CCSC.

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The Green Alternative would be comprised of 226.21 acres of existing ROW and 29.20 acres of proposed ROW. Utility relocations, easements, PSLs would be variable within the APE. Depth of impact would be the estimated typical depths as described in the Introduction paragraphs.

ORANGE ALTERNATIVE

The Orange Alternative would begin at Beach Avenue on US 181, veer west of US 181 at Burleson Street and then cross the CCSC immediately west of existing US 181. The alignment would then veer west again and extend south, cross IH 37, and follows Crosstown Expressway south terminating at Morgan Avenue (see Figure 3). This alternative would include a reconstructed, fully-directional interchange at IH 37 and Crosstown Expressway. The termini for the Orange Alternative are Beach Avenue on the north and IH 37 on the south, with a transition back to existing IH 37 at Buddy Lawrence Drive on the west and Shoreline Boulevard on the east. The transition back to the existing Crosstown Expressway would extend south to Morgan Avenue.

The Orange Alternative would be on a new location alignment west of the existing US 181 and Harbor Bridge. The location of the new bridge would be offset approximately 100 feet to the west of the existing bridge to allow for travel lanes to remain open on the existing bridge while construction proceeded on the new bridge.

The Orange Alternative would have three 12-foot-wide main lanes in each direction with a median barrier and 12-foot-wide inside and 10-foot-wide outside shoulders. This alternative would also include a 10-foot-wide shared use path. The ROW width for this alternative would vary from approximately 200 to 430 feet.

The existing Harbor Bridge and the US 181 embankment on both the north and south approaches to the bridge would be removed as part of this proposed alternative. US 181 would be converted to an at-grade boulevard section, similar to the Red Alternative, utilizing a realigned Tanchahua and Caranchahua Streets one-way pair—Tanchahua Street southbound and Caranchahua Street northbound—to access the existing surface streets downtown.

North of the CCSC, proposed US 181 would return to the existing alignment at Burleson Street with the first northbound exit to be provided at Beach Avenue. The full transition back to existing US 181 would be approximately 1,100 feet north of Beach Avenue.

The Orange Alternative would be comprised of 299.33 acres of existing ROW and 78.60 acres of proposed ROW. Utility relocations, easements, PSLs would be variable within the APE. Depth of impact would be the estimated typical depths as described in the Introduction paragraphs.

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RED ALTERNATIVE

The Red Alternative would begin at Beach Avenue on US 181, veer west of existing US 181 just north of Burleson Street, and then crosses the CCSC about 1,500 feet west of existing US 181 (see Figure 4). The alignment would then extend south to IH 37 at the interchange with the Crosstown Expressway, continue south along Crosstown, and terminate at Morgan Avenue.

The Red Alternative would be on a new location alignment west of existing US 181 and the Harbor Bridge. The new bridge would be 1,500 feet to the west of the existing bridge. This alternative would include a reconstructed, fully-directional interchange at IH 37 and Crosstown Expressway. The termini for the Red Alternative would be Beach Avenue on the north and IH 37 on the south, with a transition back to existing IH 37 at Buddy Lawrence Drive on the west and Shoreline Boulevard on the east. The transition back to the existing Crosstown Expressway would extend to Morgan Avenue.

The Red Alternative would have three 12-foot-wide main lanes in each direction with a median barrier and 12-foot-wide inside and 10-foot-wide outside shoulders. This alternative would also include a 10-foot-wide shared use path, separated from main lane traffic by a 2-foot-wide concrete barrier. The ROW width for this alternative would vary from approximately 200 feet to 430 feet.

The existing Harbor Bridge and the US 181 embankment on both the north and south approaches to the bridge would be removed as part of this proposed alternative. US 181 would be converted to an at-grade boulevard section, utilizing a realigned Tanchahua and Carancahua Streets one-way pair—Tanchahua Street southbound and Carancahua Street northbound—to access the existing surface streets downtown.

The Red Alternative would reconstruct the IH 37 / Crosstown interchange, including a complete set of 8 direct-connector ramps, one for each directional movement of traffic. On the northside of IH 37, several points of access and the configuration of certain surface streets would be modified. North of the CCSC, proposed US 181 would return to the existing alignment at Burleson.

The Red Alternative would be comprised of 297.69 acres of existing ROW and 73.28 acres of proposed ROW. Utility relocations, easements, PSLs would be variable within the APE. Depth of impact would be the estimated typical depths as described in the Introduction paragraphs.

WEST ALTERNATIVE

The West Alternative would begin at Beach Avenue on US 181 and then veer to the west nearly parallel to the CCSC (see Figure 5). The West Alternative would then turn south, crossing Navigation Boulevard just north of the CCSC. It would then cross the CCSC and continue south, generally parallel and to the east of Nueces Bay Boulevard to IH 37. Along IH 37, the transition for the West Alternative would extend west to Up River Road and east to Staples Street. Along

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Crosstown Expressway, the transition for the West Alternative would extend south and terminate between Comanche Street and Laredo Street.

The West Alternative would be on a new location alignment west of existing US 181 and the Harbor Bridge. The new bridge would be approximately 1.25 miles to the west of the existing bridge. This alternative would include a new interchange at IH 37 near Nueces Bay Boulevard and a reconstructed interchange at IH 37 and Crosstown Expressway. The termini for the West Alternative would be Beach Avenue on the north and IH 37 on the south, with a transition back to existing IH 37 at Up River Road on the west and North Staples Street on the east. The transition back to the existing Crosstown Expressway would extend approximately 600 feet south of Comanche Street.

The path of the West Alternative would run parallel to and east of Nueces Bay Boulevard from IH 37 to the CCSC. The proposed West Alternative would return to the existing US 181 alignment approximately 0.25 mile north of Burleson Street.

The West Alternative would have three 12-foot-wide main lanes in each direction with a median barrier and 12-foot-wide inside and 10-foot-wide outside shoulders. This alternative would also include a 10-foot-wide shared use path. The bicycle and pedestrian facilities would extend from Peabody Avenue at the IH 37 westbound frontage road on the south to Gulf Spray Avenue on the north. The ROW width for this alternative would vary from 320 to 570 feet.

The existing Harbor Bridge and the US 181 embankment on both the north and south approaches to the bridge would be removed as part of this proposed alternative. US 181 would be converted to an at-grade boulevard section, similar to the Red and Orange Alternatives, utilizing a realigned Tanchahua and Caranchahua Streets one-way pair—Tanchahua Street southbound and Caranchahua Street northbound—to access the existing surface streets downtown.

The West Alternative would be comprised of 225.77 acres of existing ROW and 73.70 acres of proposed ROW. Utility relocations, easements, PSLs would be variable within the APE. Depth of impact would be the estimated typical depths as described in the Introduction paragraphs.

GEOLOGY

Within the study area, the primary geologic formation is the late Pleistocene-age Beaumont Formation. There are several units within the formation and together these units span between 35,000 and 115,000 years BP. Somewhat younger is the Deweyville Terraces along the Trinity and Nueces Rivers dating between 15,000 to 20,000 years BP. These terraces are between the younger river flood plains and the Beaumont Formation terraces.

The youngest geologic formations are Holocene-age valley fills, constituting floodplains and low terraces. The two most common landforms are late Holocene terraces ranging in age from 1000 to 5000 years BP and the modern floodplains dating to within the last 1,000 years. The Beaumont Formation and the Deweyville Terraces are likely too ancient to contain intact prehistoric archeological deposits, given the current available dates of human occupation in

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Texas. Any archeological material would be at the surface or shallowly buried in exposures of Beaumont Formation and the Deweyville terraces. The presence of Holocene-age alluvial fill would indicate potential for buried archeological materials.

SOILS

The Web Soil Survey, courtesy of the United States Department of Agriculture Natural Resources Conservation Service, indicates that the soils mapped within the study area include Ijam clay loam, Tidal flats, and Urban land.

Ijam clay loam soils formed on linear flats from recent (modern) sandy and loamy redeposited dredge spoils bordering waterways, ditches, and canals. Previous geoarcheological assessments of these soils in coastal areas of the nearby counties suggest that they exhibit no geoarcheological potential for the presence of cultural materials in good context.

Tidal flats are mapped only within a small portion of the West Alternative on the north side of the CCSC that was under shallow tidal waters prior to construction of the CCSC. This portion of the study area is unlikely to have been desirable from a prehistoric habitation standpoint.

Urban land comprises most of the study area, including all areas on the south side of the CCSC encompassed by the alternatives. Urban land is also mapped on the North Beach area within the Green, Orange, and Red Alternatives. The extent of disturbances from urbanization is likely highly varied, depending on the depths of impacts from various construction activities. Thus, the degree to which potential archeological deposits have been disturbed is uncertain. The project area is heavily urbanized, located in downtown Corpus Christi.

Texas General Land Office historic aerial imagery, dating back to 1950, was examined in order to identify past and present disturbances in the project area. The types of disturbances noted include former and existing industrial, petroleum, natural gas, and manufacturing facilities, former and existing commercial and residential buildings and housing developments, construction, expansion and modifications along the CCSC, and disturbances related to new highway and roadway construction. Most of the proposed alternative alignments follow existing roadway ROW, which has undergone extensive past disturbances. In many cases where new ROW would be obtained, the areas are already impacted by former commercial and/or residential or industrial structures that are no longer present.

According to soil data, the area to the south of the CCSC is entirely within areas mapped as Urban land. The north side of the CCSC is within dredge spoil material as well as Urban land and developed areas. The depth of urbanization impacts and/or fill material over native soil surfaces is currently unknown. The geomorphological and geoarcheological setting of the project area in general is such that any archeological artifacts and features would have been situated on pre-Holocene age surfaces associated with the Beaumont Formation or Deweyville Terraces. As such, even shallow impacts would have likely disrupted the cultural context of any buried archeological sites, such that they no longer retain any aspects of integrity, especially integrity of location or association. However, review of historic aerial imagery suggests that the

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extent of prior disturbances varies across the entire project area. Image sequences also suggest several patchy areas have escaped any significant impacts, at least as seen in the last 60 years of available photographic record.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS

Review of the Texas Archeological Sites Atlas (Atlas) shows three previously recorded archeological sites (41NU251, 41NU253, and 41NU260) and six previously conducted archeological investigations within 1.0 kilometer (0.62 mile) of the proposed project alternatives. None of the recorded sites are shown to extend into the proposed project alternatives.

Site 41NU251 is located between Peoples and Schatzell Streets, approximately 400 meters (1,312.3 feet) from the Green and West Alternatives. The Atlas does not have any information for this site.

Site 41NU253 was recorded during excavations for the Texas State Aquarium. The site is described as a portion of General Zachary Taylor's campsite, occupied prior to the US — Mexican War. Artifacts were found at depths from 8 to 20 inches, in the southwest corner of the survey area. However, soils at this site were reported as very sandy, disturbed, and mixed. The site is approximately 150 meters (500 feet) east of the Green and Orange alignments.

Site 41NU260 consists of an apparent trash pit containing late nineteenth century bottles and refuse. The site is recorded approximately 300 meters (984.2 feet) beyond the proposed alternatives, along IH 37 to the north.

Six known cemeteries are located within 1 kilometer (0.62 mile) of any of the proposed alternatives. These include the Rose Hill Cemetery, New Bayview Cemetery, Hillcrest Cemetery, Old Bayview Cemetery, Holy Cross Cemetery, and Hebrew Rest Cemetery. Only Hebrew Rest Cemetery is adjacent to any of the alternatives under consideration. The Hebrew Rest Cemetery is located at State Spur 544 and SH 286 and located adjacent to the Orange and Red Alternatives. According to available plans, the cemetery will not be impacted.

Two of the previously completed archeological investigations intersect the area of potential effects for the proposed alternatives. In 1984, the US Army Corp of Engineers (USACE) conducted a survey in a dredge-spoil site immediately north of CCSC. The surveyed area measures approximately 250 acres and is bisected by a portion of the West Alternative. No archeological sites were recorded during this survey. In 2008, Prewitt and Associates, Inc., completed an archeological reconnaissance survey that extended into the Orange and Red Alternatives. No archeological sites were recorded during this survey.

In 1984, the USACE completed an archeological survey along the northeastern corner of the North Beach area at Rincon Point. The survey covered approximately 8.5 acres and was situated approximately 500 meters (1,640.4 feet) north of the project terminus at Beach Avenue. The survey area did not extend into any of the proposed Alternatives. No archeological sites were recorded during this survey.

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In 1985, the USACE conducted a survey in the vicinity of the museum district, along North Chaparral and Resaca Streets. The project area measured approximately 6 acres and is approximately 200 meters (656 feet) east of the Green Alternative and a portion of the West Alternative. No archeological sites were recorded during this survey.

In 1989, Archeology Consultants, Inc., conducted a survey prior to the construction of the Texas State Aquarium, located due east of the North Beach bridge approach, immediately on the north site of CCSC. The surveyed area measured approximately 6 acres and is approximately 150 meters (492 feet) east of portions of the Green and Orange Alternatives. This survey recorded site 41NU253, an historic-age site described above. Additional investigations were conducted at that site.

In 2006, Coastal Environments, Inc., conducted archeological monitoring approximately 200 meters (656 feet) north of IH 37 and the proposed Alternatives for this project. They investigated in area that measured approximately 3 acres. No archeological sites were recorded during this survey.

RECOMMENDATIONS

Due to the above mentioned considerations, TxDOT recommends that additional archeological investigations be conducted to confirm the presence or absence of intact archeological deposits that could be adversely impacted by the undertaking. The additional archeological investigations may include activities ranging from further background study or reconnaissance survey to intensive survey, with likelihood for mechanical trenching and/or shovel testing. The minimum level of effort would be a background study of the proposed project APE. This study would include review of available maps, databases, reports, and other archival documentation. The information would be evaluated for natural conditions, results of previous archeological projects, and/or existing disturbances that could affect the presence or preservation of archeological deposits. TxDOT would continue consultation in the event that additional archeological investigations reveal archeological deposits that could be adversely impacted by the undertaking.

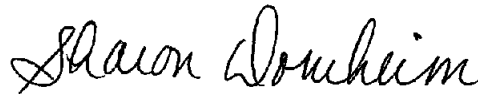
In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease, and TxDOT archeological staff will be contacted to initiate post-review discovery procedures under the provisions of the PA-TU and the Memorandum of Understanding (MOU) between TxDOT and the Texas Historical Commission.

According to our procedures under Section 106 of the NHPA, we are writing to request any comments you may have on the TxDOT recommendation. Please provide your comments within 30 days of receipt of this letter. Any comments provided after that time will be addressed to the fullest extent possible. If you do not object with the recommendation, please sign below to indicate your concurrence. If we do not hear from you within the comment period provided, we will continue with the effort as presented in this letter.

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Thank you for your attention to this matter. If you have questions, please contact Eric Oksanen (TxDOT Archeologist) at 512/416-2505 (email: Eric.Oksanen@txdot.gov) or me at 512/416-2638 (email: Sharon.Dornheim@txdot.gov). When replying to this correspondence by US Mail, please ensure that the envelope address includes reference to the Archeological Studies Branch, Environmental Affairs Division.

Sincerely,



Sharon Dornheim
Staff Archeologist / Consultation Coordinator
Environmental Affairs Division

Concurrence by: _____

Date: _____

Attachments

cc w/attachments:

Christopher Amy, TxDOT Corpus Christi District Environmental Coordinator;
Mike Chavez, ENV-PD TxDOT;
Eric Oksanen, ENV-ARCH TxDOT;
ENV-ARCH Project File / ENV-ARCH ECOS

The attached letter was sent to the following Other Consulting Parties on June 18, 2013:

Ms. Teri Ficken, Public Relations Chairperson
Corpus Christi Area Heritage Society
202 Ghent Place
Portland, TX 78374

Mr. Jerry Bauman, Steward
Coastal Bend Archaeological Society
12928 McBurnett Dr.
Corpus Christi, TX 78410

Dr. Jack Keller, Director
TAS Region 7
Southern Archaeological Consultants, Inc.
117 Calle Conejo
Los Fresnos, TX 78566

Ms. Anita Eisenhower, President
Nueces County Historical Commission
P.O. Box 260056
Corpus Christi, TX 78410



Texas Department of Transportation[®]

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

June 18, 2013

Mr. Donnie Cabaniss, Chairman
Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, OK 73005

RE: CSJ: 0101-06-095; Harbor Bridge and US 181, Bridge Replacement and Roadway Improvements, Four Alternatives Proposed for the Project Location, City of Corpus Christi; Nueces County, Corpus Christi District

Dear Mr. Cabaniss:

The above referenced transportation project is being considered for construction by the Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT). Environmental studies are in the process of being conducted for this project. The purpose of this letter is to contact you in order to initiate Section 106 consultation with your Tribe pursuant to stipulations of the First Amended Programmatic Agreement among the Federal Highway Administration, the Texas Department of Transportation, the Texas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU). The project is located in an area that is of interest to your Tribe.

INTRODUCTION

The proposed project would replace the existing Harbor Bridge and re-route sections of United States Highway (US) 181, a six-lane divided highway in Corpus Christi, Nueces County, Texas. Harbor Bridge spans the Corpus Christi Ship Channel (CCSC) and carries US 181. As part of the planning process, four possible highway routes and locations for a new bridge are being considered. The enclosed map identifies the proposed alternatives (Green, Orange, Red, West) (see Figure 1). A preferred route has not yet been selected.

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The Red Alternative would be on a new location alignment west of existing US 181 and the Harbor Bridge. The new bridge would be 1,500 feet to the west of the existing bridge. This alternative would include a reconstructed, fully-directional interchange at IH 37 and Crosstown Expressway. The termini for the Red Alternative would be Beach Avenue on the north and IH 37 on the south, with a transition back to existing IH 37 at Buddy Lawrence Drive on the west and Shoreline Boulevard on the east. The transition back to the existing Crosstown Expressway would extend to Morgan Avenue.

The Red Alternative would have three 12-foot-wide main lanes in each direction with a median barrier and 12-foot-wide inside and 10-foot-wide outside shoulders. This alternative would also include a 10-foot-wide shared use path, separated from main lane traffic by a 2-foot-wide concrete barrier. The ROW width for this alternative would vary from approximately 200 feet to 430 feet.

The existing Harbor Bridge and the US 181 embankment on both the north and south approaches to the bridge would be removed as part of this proposed alternative. US 181 would be converted to an at-grade boulevard section, utilizing a realigned Tanchahua and Carancahua Streets one-way pair—Tanchahua Street southbound and Carancahua Street northbound—to access the existing surface streets downtown.

The Red Alternative would reconstruct the IH 37 / Crosstown interchange, including a complete set of 8 direct-connector ramps, one for each directional movement of traffic. On the northside of IH 37, several points of access and the configuration of certain surface streets would be modified. North of the CCSC, proposed US 181 would return to the existing alignment at Burleson.

The Red Alternative would be comprised of 297.69 acres of existing ROW and 73.28 acres of proposed ROW. Utility relocations, easements, PSLs would be variable within the APE. Depth of impact would be the estimated typical depths as described in the Introduction paragraphs.

WEST ALTERNATIVE

The West Alternative would begin at Beach Avenue on US 181 and then veer to the west nearly parallel to the CCSC (see Figure 5). The West Alternative would then turn south, crossing Navigation Boulevard just north of the CCSC. It would then cross the CCSC and continue south, generally parallel and to the east of Nueces Bay Boulevard to IH 37. Along IH 37, the transition for the West Alternative would extend west to Up River Road and east to Staples Street. Along

Re: Section 106 Consultation, National Historic Preservation Act;
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Crosstown Expressway, the transition for the West Alternative would extend south and terminate between Comanche Street and Laredo Street.

The West Alternative would be on a new location alignment west of existing US 181 and the Harbor Bridge. The new bridge would be approximately 1.25 miles to the west of the existing bridge. This alternative would include a new interchange at IH 37 near Nueces Bay Boulevard and a reconstructed interchange at IH 37 and Crosstown Expressway. The termini for the West Alternative would be Beach Avenue on the north and IH 37 on the south, with a transition back to existing IH 37 at Up River Road on the west and North Staples Street on the east. The transition back to the existing Crosstown Expressway would extend approximately 600 feet south of Comanche Street.

The path of the West Alternative would run parallel to and east of Nueces Bay Boulevard from IH 37 to the CCSC. The proposed West Alternative would return to the existing US 181 alignment approximately 0.25 mile north of Burleson Street.

The West Alternative would have three 12-foot-wide main lanes in each direction with a median barrier and 12-foot-wide inside and 10-foot-wide outside shoulders. This alternative would also include a 10-foot-wide shared use path. The bicycle and pedestrian facilities would extend from Peabody Avenue at the IH 37 westbound frontage road on the south to Gulf Spray Avenue on the north. The ROW width for this alternative would vary from 320 to 570 feet.

The existing Harbor Bridge and the US 181 embankment on both the north and south approaches to the bridge would be removed as part of this proposed alternative. US 181 would be converted to an at-grade boulevard section, similar to the Red and Orange Alternatives, utilizing a realigned Tanchua and Caranchua Streets one-way pair—Tanchua Street southbound and Caranchua Street northbound—to access the existing surface streets downtown.

The West Alternative would be comprised of 225.77 acres of existing ROW and 73.70 acres of proposed ROW. Utility relocations, easements, PSLs would be variable within the APE. Depth of impact would be the estimated typical depths as described in the Introduction paragraphs.

GEOLOGY

Within the study area, the primary geologic formation is the late Pleistocene-age Beaumont Formation. There are several units within the formation and together these units span between 35,000 and 115,000 years BP. Somewhat younger is the Deweyville Terraces along the Trinity and Nueces Rivers dating between 15,000 to 20,000 years BP. These terraces are between the younger river flood plains and the Beaumont Formation terraces.

The youngest geologic formations are Holocene-age valley fills, constituting floodplains and low terraces. The two most common landforms are late Holocene terraces ranging in age from 1000 to 5000 years BP and the modern floodplains dating to within the last 1,000 years. The Beaumont Formation and the Deweyville Terraces are likely too ancient to contain intact prehistoric archeological deposits, given the current available dates of human occupation in

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Texas. Any archeological material would be at the surface or shallowly buried in exposures of Beaumont Formation and the Deweyville terraces. The presence of Holocene-age alluvial fill would indicate potential for buried archeological materials.

SOILS

The Web Soil Survey, courtesy of the United States Department of Agriculture Natural Resources Conservation Service, indicates that the soils mapped within the study area include Ijam clay loam, Tidal flats, and Urban land.

Ijam clay loam soils formed on linear flats from recent (modern) sandy and loamy redeposited dredge spoils bordering waterways, ditches, and canals. Previous geoarcheological assessments of these soils in coastal areas of the nearby counties suggest that they exhibit no geoarcheological potential for the presence of cultural materials in good context.

Tidal flats are mapped only within a small portion of the West Alternative on the north side of the CCSC that was under shallow tidal waters prior to construction of the CCSC. This portion of the study area is unlikely to have been desirable from a prehistoric habitation standpoint.

Urban land comprises most of the study area, including all areas on the south side of the CCSC encompassed by the alternatives. Urban land is also mapped on the North Beach area within the Green, Orange, and Red Alternatives. The extent of disturbances from urbanization is likely highly varied, depending on the depths of impacts from various construction activities. Thus, the degree to which potential archeological deposits have been disturbed is uncertain. The project area is heavily urbanized, located in downtown Corpus Christi.

Texas General Land Office historic aerial imagery, dating back to 1950, was examined in order to identify past and present disturbances in the project area. The types of disturbances noted include former and existing industrial, petroleum, natural gas, and manufacturing facilities, former and existing commercial and residential buildings and housing developments, construction, expansion and modifications along the CCSC, and disturbances related to new highway and roadway construction. Most of the proposed alternative alignments follow existing roadway ROW, which has undergone extensive past disturbances. In many cases where new ROW would be obtained, the areas are already impacted by former commercial and/or residential or industrial structures that are no longer present.

According to soil data, the area to the south of the CCSC is entirely within areas mapped as Urban land. The north side of the CCSC is within dredge spoil material as well as Urban land and developed areas. The depth of urbanization impacts and/or fill material over native soil surfaces is currently unknown. The geomorphological and geoarcheological setting of the project area in general is such that any archeological artifacts and features would have been situated on pre-Holocene age surfaces associated with the Beaumont Formation or Deweyville Terraces. As such, even shallow impacts would have likely disrupted the cultural context of any buried archeological sites, such that they no longer retain any aspects of integrity, especially integrity of location or association. However, review of historic aerial imagery suggests that the

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extent of prior disturbances varies across the entire project area. Image sequences also suggest several patchy areas have escaped any significant impacts, at least as seen in the last 60 years of available photographic record.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS

Review of the Texas Archeological Sites Atlas (Atlas) shows three previously recorded archeological sites (41NU251, 41NU253, and 41NU260) and six previously conducted archeological investigations within 1.0 kilometer (0.62 mile) of the proposed project alternatives. None of the recorded sites are shown to extend into the proposed project alternatives.

Site 41NU251 is located between Peoples and Schatzell Streets, approximately 400 meters (1,312.3 feet) from the Green and West Alternatives. The Atlas does not have any information for this site.

Site 41NU253 was recorded during excavations for the Texas State Aquarium. The site is described as a portion of General Zachary Taylor's campsite, occupied prior to the US — Mexican War. Artifacts were found at depths from 8 to 20 inches, in the southwest corner of the survey area. However, soils at this site were reported as very sandy, disturbed, and mixed. The site is approximately 150 meters (500 feet) east of the Green and Orange alignments.

Site 41NU260 consists of an apparent trash pit containing late nineteenth century bottles and refuse. The site is recorded approximately 300 meters (984.2 feet) beyond the proposed alternatives, along IH 37 to the north.

Six known cemeteries are located within 1 kilometer (0.62 mile) of any of the proposed alternatives. These include the Rose Hill Cemetery, New Bayview Cemetery, Hillcrest Cemetery, Old Bayview Cemetery, Holy Cross Cemetery, and Hebrew Rest Cemetery. Only Hebrew Rest Cemetery is adjacent to any of the alternatives under consideration. The Hebrew Rest Cemetery is located at State Spur 544 and SH 286 and located adjacent to the Orange and Red Alternatives. According to available plans, the cemetery will not be impacted.

Two of the previously completed archeological investigations intersect the area of potential effects for the proposed alternatives. In 1984, the US Army Corp of Engineers (USACE) conducted a survey in a dredge-spoil site immediately north of CCSC. The surveyed area measures approximately 250 acres and is bisected by a portion of the West Alternative. No archeological sites were recorded during this survey. In 2008, Prewitt and Associates, Inc., completed an archeological reconnaissance survey that extended into the Orange and Red Alternatives. No archeological sites were recorded during this survey.

In 1984, the USACE completed an archeological survey along the northeastern corner of the North Beach area at Rincon Point. The survey covered approximately 8.5 acres and was situated approximately 500 meters (1,640.4 feet) north of the project terminus at Beach Avenue. The survey area did not extend into any of the proposed Alternatives. No archeological sites were recorded during this survey.

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In 1985, the USACE conducted a survey in the vicinity of the museum district, along North Chaparral and Resaca Streets. The project area measured approximately 6 acres and is approximately 200 meters (656 feet) east of the Green Alternative and a portion of the West Alternative. No archeological sites were recorded during this survey.

In 1989, Archeology Consultants, Inc., conducted a survey prior to the construction of the Texas State Aquarium, located due east of the North Beach bridge approach, immediately on the north site of CCSC. The surveyed area measured approximately 6 acres and is approximately 150 meters (492 feet) east of portions of the Green and Orange Alternatives. This survey recorded site 41NU253, an historic-age site described above. Additional investigations were conducted at that site.

In 2006, Coastal Environments, Inc., conducted archeological monitoring approximately 200 meters (656 feet) north of IH 37 and the proposed Alternatives for this project. They investigated in area that measured approximately 3 acres. No archeological sites were recorded during this survey.

RECOMMENDATIONS

Due to the above mentioned considerations, TxDOT recommends that additional archeological investigations be conducted to confirm the presence or absence of intact archeological deposits that could be adversely impacted by the undertaking. The additional archeological investigations may include activities ranging from further background study or reconnaissance survey to intensive survey, with likelihood for mechanical trenching and/or shovel testing. The minimum level of effort would be a background study of the proposed project APE. This study would include review of available maps, databases, reports, and other archival documentation. The information would be evaluated for natural conditions, results of previous archeological projects, and/or existing disturbances that could affect the presence or preservation of archeological deposits. TxDOT would continue consultation in the event that additional archeological investigations reveal archeological deposits that could be adversely impacted by the undertaking.

In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease, and TxDOT archeological staff will be contacted to initiate post-review discovery procedures under the provisions of the PA-TU and the Memorandum of Understanding (MOU) between TxDOT and the Texas Historical Commission.

According to our Programmatic Agreement under Section 106 of the National Historic Preservation Act, we are writing to request your comments on historic properties of cultural or religious significance to your Tribe that may be affected by the proposed project APE and the area within the above defined buffer. Any comments you may have on the TxDOT recommendation should also be provided. Please provide your comments within 30 days of receipt of this letter. Any comments provided after that time will be addressed to the fullest

Re: Section 106 Consultation, National Historic Preservation Act;
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extent possible. If you do not object with a recommendation of "no historic properties affected," please sign below to indicate your concurrence. In the event that further investigations by our office disclose the presence of archeological deposits, we will contact your Tribe to continue consultation.

Thank you for your attention to this matter. If you have questions, please contact Eric Oksanen (TxDOT Archeologist) at 512/416-2505 (email: Eric.Oksanen@txdot.gov) or me at 512/416-2638 (email: Sharon.Dornheim@txdot.gov). When replying to this correspondence by US Mail, please ensure that the envelope address includes reference to the Archeological Studies Branch, Environmental Affairs Division.

Sincerely,



Sharon Dornheim
Staff Archeologist / Consultation Coordinator
Environmental Affairs Division

Concurrence by:

Date:

Attachments

cc w/attachments:

Christopher Amy, TxDOT Corpus Christi District Environmental Coordinator;
Mike Chavez, ENV-PD TxDOT;
Eric Oksanen, ENV-ARCH TxDOT;
ENV-ARCH Project File / ENV-ARCH ECOS

The attached letter was sent to the following tribes on June 18, 2013:

Mr. Donnie Cabaniss, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

Mr. Jimmy Arterberry, THPO
Comanche Nation of Oklahoma
Comanche Nation Office of Historic Preservation
P.O. Box 908
Lawton, OK 73502

Ms. Amie Tah-Bone
Museum Director and NAGPRA Representative
Kiowa Indian Tribe of Oklahoma
P.O. Box 885
Carnegie, OK 73015

Mr. Frederick Chino, Sr., President
c/o Holly Houghten
Mescalero Apache Tribe
P.O. Box 227
Mescalero, NM 88340

Mr. Don Patterson, President
Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Rd
Tonkawa, OK 74653

[emailed to Miranda Myer]



Figure 1. Location of proposed alternatives



Figure 2. Limits of Green Alternative



Figure 3. Limits of Orange Alternative



Figure 4. Limits of Red Alternative

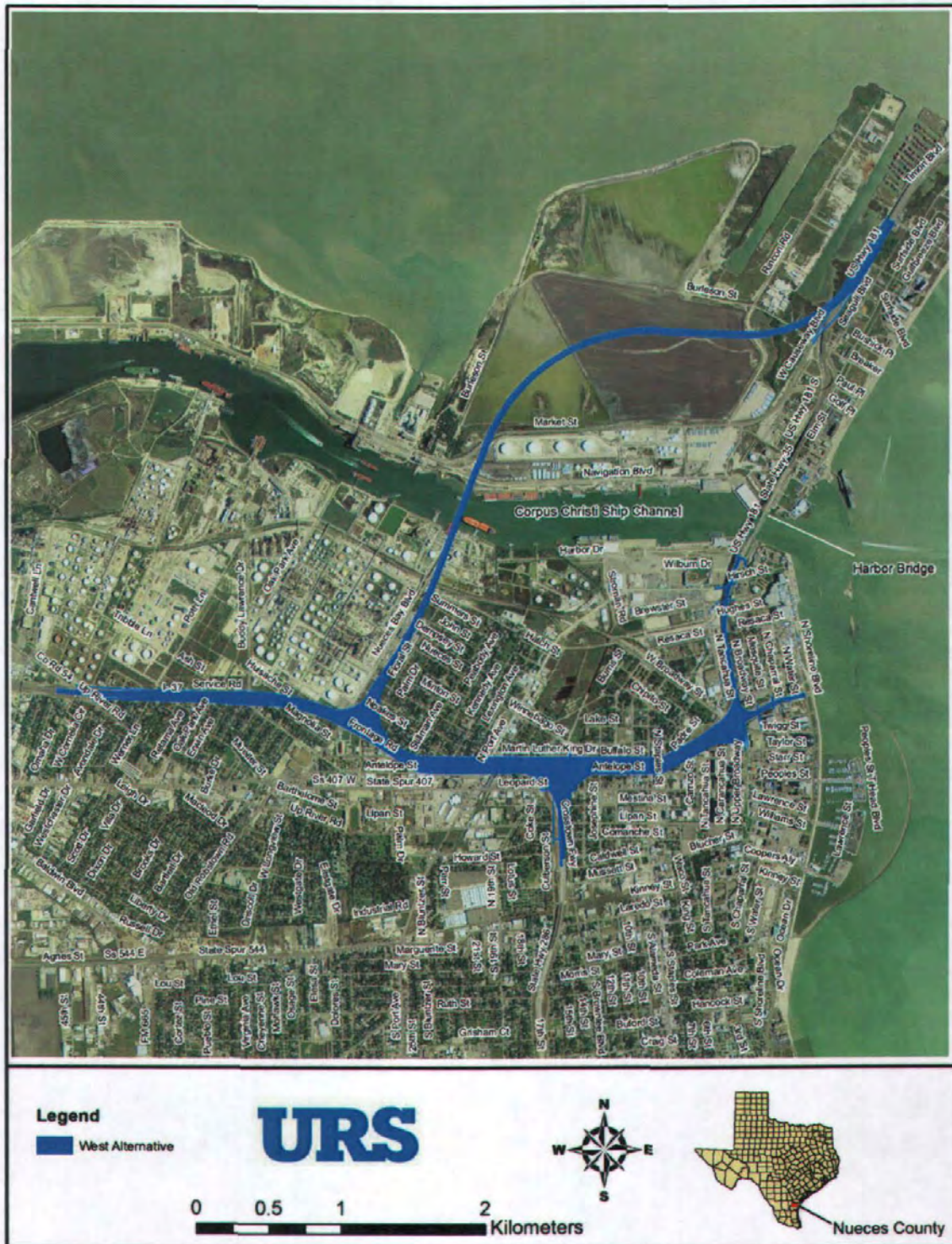


Figure 5. Limits of West Alternative.

From: [Eric Oksanen](#)
To: [Michael Chavez](#)
Cc: [Sonya Hernandez](#)
Subject: FW: Section 106 Comments: CSJ: 0101-06-095; Harbor Bridge and US 181 Bridge Roadway Improvements
Date: Thursday, July 18, 2013 3:10:09 PM

From: Andrew Dimas [mailto:AndrewD@cctexas.com]
Sent: Thursday, July 18, 2013 3:07 PM
To: Sharon Dornheim; Eric Oksanen
Cc: Dan Biles; Jamie Pyle
Subject: Section 106 Comments: CSJ: 0101-06-095; Harbor Bridge and US 181 Bridge Roadway Improvements

Good Afternoon,

Thank you for your correspondence regarding the section 106 consultation for the following project: CSJ: 0101-06-095; Harbor Bridge and US 181 Bridge Roadway Improvements. As requested, the only comments applicable regarding historic/cultural/archeological are fortunately reiterations of previous comments that have been resolved. We are pleased that the archeological studies were done and agree with your recommendation to have additional investigations conducted as needed. Additionally, conversations with Hicks Environmental and local TXDOT staff, identified historic landmarks such as the Galvan Ballroom and the Navarro Housing Complex. These sites were taken into account in the latest design. I am happy to report that the latest designs for all of the alternatives, the threat to these two landmarks was eliminated. If we may be of further assistance, please let us know.

Kindest Regards,

Andrew Dimas
City Planner
Planning and Environmental Services Department
City of Corpus Christi
(361) 826-3592

June 27, 2013

Section 106 Consultation

Transmittal of URS Corporation Draft Report; *Archeological Background Studies for the Proposed Construction of a New Harbor Bridge over the Corpus Christi Ship Channel, Nueces County*, CSJ: 0101-06-095

Ms. Pat Mercado-Allinger,
Division of Archeology, Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711

Dear Ms. Mercado-Allinger:

The above proposed project will be undertaken with state and federal funds. As required by the First Amended Programmatic Agreement (PA, 2005) and the Memorandum of Understanding with your agency, we are initiating Section 106 of the National Historic Preservation Act (Section 106) consultation with your office on this project and are enclosing for your review and processing a draft report of an archeological background studies report conducted by URS Corporation with Steve Ahr as Principal Investigator and author. The report was produced as a technical document in support of a Draft Environmental Impact Statement (DEIS) for the New Harbor Bridge Project.

The proposed project would replace the existing bridge carrying United States Highway (US) 181 over the Corpus Christi Ship Channel. In addition to the bridge, the approaches would be reworked requiring new alignments and modifications to US 181 and Interstate Highway (IH) 37. Four possible routes have been selected for analyses and the enclosed report examines the potential routes for potential impacts to archeological resources.

The Area of Potential Effects (APE) is the footprint of each of the proposed alignments. The depth of impact varies from 2 ft where surface pavement would be installed to greater than 50 ft at locations for drilled shafts used for support piers. The four alignments are the Green Alternative, Red Alternative, Orange Alternative and West Alternative. According to the Texas Archeological Sites Atlas, there are no archeological sites mapped within the APE. No recorded cemeteries are within the proposed APE and plans were clarified to demonstrate there would be no direct impact to the Hebrew Rest Cemetery (NU-CO25) by the Red and Orange Alternatives.

The alignments, for the most part, are in developed urban and industrial settings. Historic maps and aerial imagery document alterations to the topography in the APE from development. The report analyzes each alternative for potential impacts to archeological resources and identifies areas that have potential to contain deeply buried intact archeological deposits.

The report has undergone a major revision and the current draft reflects TxDOT comments. TxDOT archeologists have reviewed and the draft and feel that it has sufficiently investigated the proposed alignment APEs. Given the extensive disturbances along the alignment APEs, only a few areas were identified for potential field investigations. Chapter 5, Table 2 (p. 93), summarizes the potential for alignments to contain significant historic archeological properties (as defined in 36 CFR.60.4). These areas include the vicinity of Fort Marcy, the encampment of Zachary Taylor's expeditionary forces in 1846. Much of the APE is paved at these locations. Excavations by Jim Warren at 41NU253, thought to be a portion of Taylor's encampment, found cultural material dating to the mid-nineteenth century in mixed stratigraphy.

TxDOT concurs with the main findings in the background report, that there are no recorded archeological historic properties in the proposed APEs, and that if field investigations are necessary, then geotech coring or some similar deep-deposit sampling method may be needed. A final decision on a preferred alignment from the DEIS is expected after public hearings are held in January of 2014. Additional investigations would examine the preferred route as determined in the Final Environmental Information Statement (FEIS). The Section 106 process would then continue until completed for the preferred alignment and the project.

TxDOT is seeking concurrence from the THC that 1) this report initiates Section 106 consultation with the THC and State Historic Preservation Officer, 2) the report has adequately evaluated the APEs for potential effects to archeological historic properties, and 3) further investigations may be conducted as the result of the Section 106 consultation with participants.

If you have any other questions or have need of further information, please contact me at 416-2505. Thank you for your consideration in this matter.

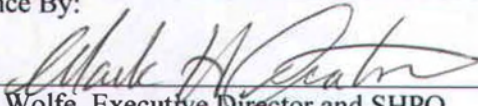
Sincerely,



Eric Oksanen, Archeological Studies Program
Environmental Affairs Division

cc w/o attachments: ECOS Project File

Concurrence By:


for: Mark Wolfe, Executive Director and SHPO
Texas Historical Commission

7-1-13
Date

August 15, 2013

Concluding Section 106 Consultation

Archeological Background Studies for the Proposed Construction of a New Harbor Bridge over the Corpus Christi Ship Channel, Nueces County, CSJ: 0101-06-095

Ms. Pat Mercado-Allinger,
Division of Archeology, Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711

Dear Ms. Mercado-Allinger:

The above referenced proposed project would utilize federal funds. In accordance with the National Historic Preservation Act of 1966, as amended; the First Amended Programmatic Agreement (PA-TU) among the Federal Highway Administration, Texas Historical Commission (THC), Advisory Council on Historic Preservation, and the Texas Department of Transportation (TxDOT); and the Memorandum of Understanding between the Texas Historical Commission and the Texas Department of Transportation (MOU), we are concluding consultation on this project.

On June 27, 2013, our office transmitted the archeological background studies report:

Revised Draft: Archeological Background Studies for the Proposed Construction of a New Harbor Bridge over the Corpus Christi Ship Channel, Nueces County, CSJ: 0101-06-095 by Steve Ahr, URS Corporation. The report suggested several locations within the proposed Area of Potential Effects (APE) for possible field investigations.

TxDOT further refined this recommendation to one location where there was potential for intact Holocene-age sediments with potential to contain preserved archeological deposits. The selected location is currently used as a city park and is surrounded by industrial properties. However, a hazardous materials (hazmat) inventory study identified a significant amount of subsurface contamination on properties adjacent to the proposed project area (see Exhibits A and B). These maps show the known hazmat sites with and adjacent to the APE. The pink and yellow screen areas are extensive and significantly polluted sites. The pink area is identified as Leather's No. 2 and the yellow area is Kerr-McGee Bulk Oil Storage Terminal 1. The numbered green dots are individual point sites, such as gasoline storage or dry cleaners that store potentially hazardous materials.

Given the extent of contamination near the area of interest, there is a high probability of encountering contaminated sediments during auguring in the proposed location. Furthermore, the distribution of the polluted areas suggests that the proposed excavation area was part of an

industrial tract. Therefore, TxDOT is proposing that no further archeological investigations are warranted, given the documented disturbances throughout the APE.

Under the terms of the PA-TU and the MOU, TxDOT is seeking the following concurrence from the THC: 1) No further archeological investigations are warranted, 2) a finding of No Effect on archeological historic properties and cemeteries, and 3) Section 106 consultation with the THC regarding archeological historic properties is concluded.

In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease and TxDOT archeological staff will be contacted to initiate post-review discovery procedures under the provisions of the PA-TU and MOU.

If you have any other questions or have need of further information, please contact me at 416-2505. Thank you for your consideration in this matter.

Sincerely,



Eric Oksanen, Archeological Studies Program
Environmental Affairs Division

attachments

cc: w/ attachments: ECOS Project File

Concurrence By:



for: Mark Wolfe, Executive Director and SHPO
Texas Historical Commission

8-16-13

Date

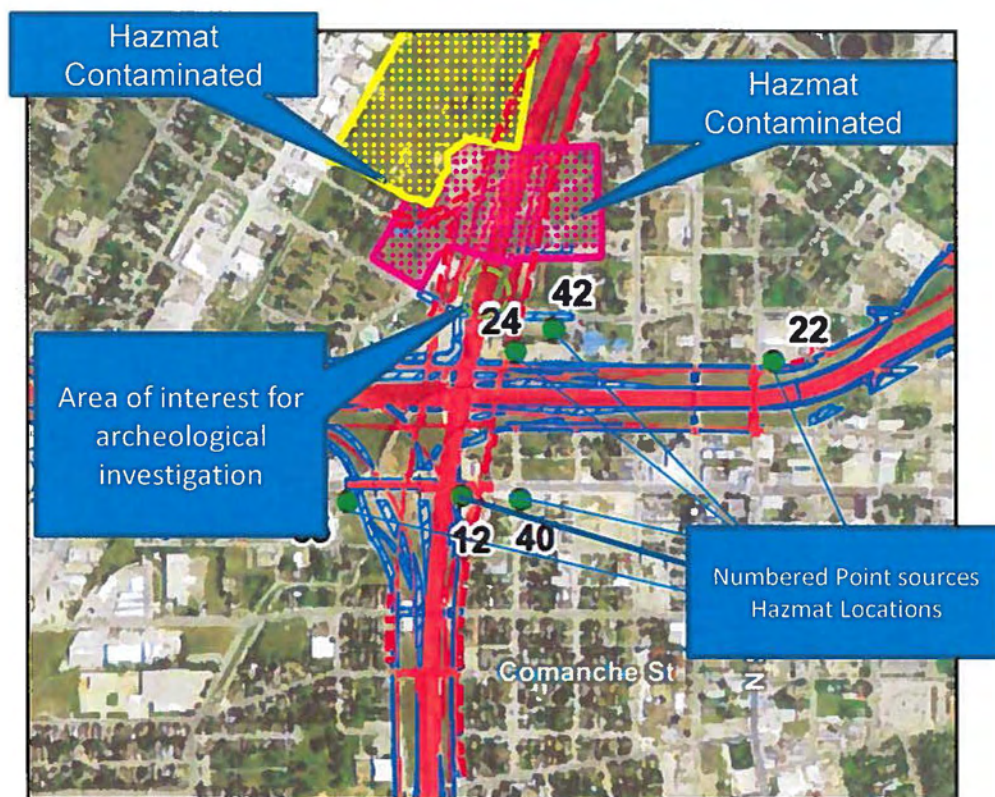
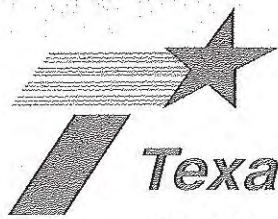


Exhibit B: Detail of hazardous materials locations and archeological investigations locations

SECTION 4(f) COORDINATION



Texas Department of Transportation

1701 SOUTH PADRE ISLAND DRIVE • CORPUS CHRISTI, TEXAS 78416 • (361) 808-2300

January 28, 2013

City of Corpus Christi
Mr. Michael Morris
Parks and Recreation Department
P.O. Box 9277
Corpus Christi, TX 78469-9277

RE: Request for Significance Determination

Dear Mr. Morris:

The Texas Department of Transportation (TxDOT), Corpus Christi District, is developing the US 181 Harbor Bridge project to maximize the long-term highway operability of the US 181 crossing of the Corpus Christi Ship Channel and to correct design deficiencies, bringing US 181, including the Harbor Bridge, into compliance with current design standards to improve safety for the travelling public, including during hurricane evacuations. A Feasibility Study completed by TxDOT in 2003 concluded that U.S. 181 and the Harbor Bridge must be improved to maintain a safe and efficient transportation corridor. The proposed project is to be constructed with local, state, and federal funding.

An Environmental Impact Statement (EIS) is in the process of being developed for the project that will document the potential for impacts to publicly-owned parklands, recreation facilities, greenway trails, and wildlife and waterfowl refuges. The project's impacts are also being evaluated pursuant to Section 4(f) of the Department of Transportation Act of 1966, as amended, (Title 49, USC 303 and Title 23 USC 138) that affords certain protections to public parks, historic sites, and wildlife refuges. This regulation directs DOT agencies to avoid the use of Section 4(f) property unless there is no feasible or prudent alternative or unless the impact to the resource is considered de minimus, i.e. an impact that does not adversely affect the features, attributes, or activities that qualify the resource for protection.

On January 16, 2013, a coordination meeting was held with Park and Recreation Development staff and TxDOT representatives to discuss the project, the potential 4(f) resources and the possible short-term and long-term effects of the project. After careful review of the resources within the study area and consultation with your department, TxDOT has identified the following resources that would be subject to section 4(f) protection within the project corridor:

- T.C. Ayers Park
- Lovenskoild Park

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- Oveal Williams Senior Center

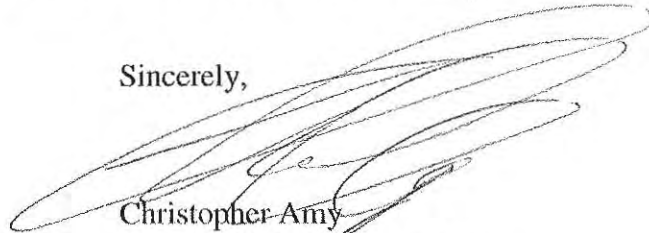
As the agency of jurisdiction for these resources, we are requesting an official designation from your department of each resource listed above. We are asking that you review the regulatory definitions provided below and respond with an official agency designation for each resource as to whether or not the resource has national, state or local significance. The designation should clearly state if the park or recreation facility is "significant" or "not significant."

Resources are afforded protection under Section 4(f) of the U.S. Department of Transportation Act when they meet the following definition:

- The resource's primary purpose is a park, recreation or refuge.
- The resource is open to the general public at any time during normal operating hours. It does not apply to a resource that visitation is permitted only to a select group or a resource that is not available to the entire public.
- The resource must be considered a significant resource by the agency with jurisdiction, meaning when the resource is compared to other similar resources operated by the agency that resource in question plays "an important role" in meeting the objectives of the agency. Significance must apply to the entire property and not just a portion of the property.

We appreciate your agency providing us with the requested information. A statement indicating the significance of each resource identified in this letter to TxDOT would allow them to fully comply with the intent of the Section 4(f) regulations. If you have any questions regarding this request, please me at 361-808-2376. Response in writing to the address above or via email at Christopher.Amy@txdot.gov within 14 days of receipt of this letter would be greatly appreciated.

Sincerely,



Christopher Amy
Environmental Coordinator
TxDOT, Corpus Christi District



City of
Corpus
Christi

**PARKS & RECREATION
DEPARTMENT**

PO Box 9277
Corpus Christi
Texas 78469-9277
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**CORPUS
CHRISTI
PARKS &
RECREATION**

February 4, 2013

Mr. Christopher Amy
Environmental Coordinator
Texas Department of Transportation
1701 South Padre Island Drive
Corpus Christi, Texas 78416

Dear Mr. Amy:

I am in receipt of your letter dated 1/28/13 in reference to "Significant Impacts Determination" of the new Harbor Bridge project. Below please find information on the significance of TC Ayers Park and Recreation Center; Lovenskiold Park; and Oveal Williams Senior Center

T.C. Ayers Recreation Center and Park – 702 N. Brownlee (8.77 park acres, 5,439 sq. ft. building)

The property's primary purpose is a park that is open to the general public and is considered a "significant" resource.

The area received Urban Parks and Recreation Recovery (UPARR) funding from the National Park Service (NPS) in 1980 and included with the funding was a requirement for the park to remain in use as a park into perpetuity. Funds were used to renovate the Recreation Center and Playground. However, the perpetuity requirement was placed on the entire property.

The Recreation Center was closed in 2008 due to City budget reductions and low attendance at the Recreation Center. It has not been used since that time. Programming was moved to the nearby Solomon Coles Recreation Center.

The perpetuity requirement may be converted to a new park and/or recreational property upon consent by the NPS.

Lovenskiold Park – 1600 Antelope Street (.70 acres)

The property's primary purpose is a park that is open to the general public and is considered a "significant" resource by the Parks and Recreation Department, as it provides open space for relaxation and recreation.

A large portion of this park was taken when Interstate-37 was built.

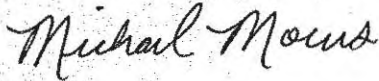
Oveal Williams Senior Center – 1414 Martin Luther King Drive (4 acres of property, 10,700 sq. ft. building)

The property's primary purpose is a recreation center for senior adults that is open to the general public and is considered a "significant" resource for programming by the Parks and Recreation Department.

The Senior Center serves not only the senior adults, but is a public building used for many other organizations and functions by the surrounding neighborhood.

Please let me know if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Michael Morris".

Michael Morris
Director
Parks and Recreation
City of Corpus Christi

MM:dr



City of
Corpus
Christi

**PARKS & RECREATION
DEPARTMENT**

PO Box 9277
Corpus Christi
Texas 78469-9277
Phone 361-826-3460
Fax 361-880-3864
www.cctexas.com
www.ccparkandrec.com

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March 27, 2013

Texas Department of Transportation
Mr. Christopher Amy
Environmental Coordinator
1701 South Padre Island Drive
Corpus Christi, Texas 78416

Dear Christopher:

I am in receipt of your letter dated 3/20/13 in reference to "Significant Impacts Determination" of the new Harbor Bridge. Below please find information on the significance of Ben Garza Park.

Ben Garza Park -

The property's primary purpose is a park that is open to the general public and is considered a "significant" resource.

The area received Urban Parks and Recreation Recovery (UPARR) funding from the National Park Service (NPS) in 1980 and included with the funding was a requirement for the park to remain in use as a park into perpetuity. Funds were used to renovate the recreational gymnasium, playfield and parking lot. It also paid for new playground equipment. Thus, as a condition of receiving the UPARR funding for this purpose, the perpetuity requirement was placed on the entire property.

The perpetuity requirement required by UPARR may be converted to a new park and/or recreational property upon consent by the NPS.

Please let me know if you have any questions.

Sincerely,

Michael Morris
Director, Parks and Recreation
City of Corpus Christi

MM:dr

CORPUS CHRISTI

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MAK 01 2013

CRP-TP&D





City of Corpus Christi

ENGINEERING SERVICES

P.O. Box 9277
Corpus Christi
Texas 78469-9277
Phone 361-826-3500
Fax 361-880-3501
www.cctexas.com

Traffic Engineering
1201 Leopard St.
Corpus Christi
Texas 78401
Phone 361-826-3547
Fax 361-826-3545

Traffic Signals
2525 Hygeia St.
Corpus Christi
Texas 78415
Phone 361-826-1610
Fax 361-826-4274

Construction Inspection
1317 Mestina St.
Corpus Christi
Texas 78401
Phone 361-826-3555
Fax 361-826-3520

April 11, 2013

Mr. Christopher Amy
Environmental Coordinator
Texas Department of Transportation
Corpus Christi District
1701 South Padre Island Drive
Corpus Christi, TX 78416

**Re: Request for Significance Determination
Proposed US 181 Harbor Bridge Alignment
Resource: Rincon Channel Wetlands**

Dear Mr. Amy:

This is in response to your letter dated January 28, 2013. You requested a significance determination of the Rincon Channel Wetlands.

The Rincon Channel Wetlands (Wetlands) is a significant resource. Staff has reviewed the language, purpose, and scope of the documents executed regarding the Wetlands. From our understanding of the regulatory definitions under Section 4(f) of the U.S. Department of Transportation Act, a determination of significant is appropriate given the specific language in the executed documents and instruments associated with this resource, including but not limited to language the reflects the following:

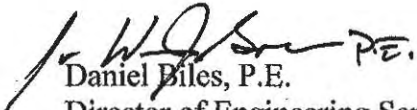
- The resource's primary purpose is a refuge.
- The resource is open to the general public and to a select group for the purpose of education.
- The resource was encumbered by the City of Corpus Christi under a Coastal Management Program Grant Agreement (Grant Agreement) (with matching funds provided by the Coastal Ben Bays and Estuaries, Inc.) with a conservation easement which would protect the land and its natural resources and preserve the public use and benefit of the land. The public notice for the conservation easement was recorded on March 25, 2005 in the Official Records of Nueces County Document # 2005014995 and states "City of Corpus Christi is placing this notice on record as confirmation of its obligation as set forth in the Grant Agreement to ensure the long-term conservation of the Property in accordance with the terms of the Grant Agreement and to obtain the consent of the U.S. Fish and Wildlife Service prior to conveyance or encumbrance of its interest in the Property."



In determining significance, we are obliged to consider the City's obligations as set forth in the Grant Agreement to ensure long-term conservation of the property, and the stated purpose of the Grant Agreement, which is "to conserve ecologically important wetlands and associated uplands in the Nueces River Delta/Nueces Bay area."

The City appreciates the efforts of the Texas Department of Transportation in determining the best alignment for the future Harbor Bridge and we are happy to cooperate in any way to aid in this process. Please feel free to contact me if you require additional information.

Sincerely,


Daniel Biles, P.E.
Director of Engineering Services
City of Corpus Christi

Attachments: Notice of Grant Agreement

Notice of Grant Agreement

The City of Corpus Christi is the owner of two tracts of land totaling 36.025 acres in Nueces County, Texas, more particularly described in Exhibit A attached hereto and made part of this notice ("Property").

Notice is hereby given that the City of Corpus Christi acquired the Property in part with funds provided by the Coastal Bend Bays & Estuaries, Inc. Funds used to acquire the Property were used as match for North American Wetlands Conservation Fund funds pursuant to a Grant Agreement between the U.S. Fish and Wildlife Service and the Coastal Bend Bays & Estuaries Program, Inc., dated February 6, 2001, Agreement Number: 98210-1-G777, a copy of which is kept at the North American Waterfowl and Wetlands Office, U.S. Fish and Wildlife Service, 1849 C Street N.W., Washington, D.C. 20240.

The purpose of the grant agreement is to conserve ecologically important wetlands and associated uplands in the Nueces River Delta/Nueces Bay area.

City of Corpus Christi is placing this notice on record as confirmation of its obligation as set forth in the Grant Agreement to ensure the long-term conservation of the Property in accordance with the terms of the Grant Agreement and to obtain the consent of the U.S. Fish and Wildlife Service prior to conveyance or encumbrance of its interest in the Property.

In Witness whereof the City of Corpus Christi has set its hand and seal this 25 day of March, 2005.

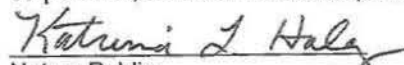
City of Corpus Christi

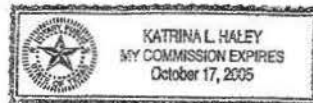
By:


Angel R. Escobar
Director, Engineering Services

THE STATE OF TEXAS §
 §
COUNTY OF NUECES '

This instrument was acknowledged before me on March 25th, 2005, by Angel R. Escobar, Director, Engineering Services, City of Corpus Christi, a Texas municipal corporation, on behalf of the corporation.


Notary Public
State of Texas



Motes and Bounds Description
Of
Site A

Being 18.0125 acres of land, more or less, being out of a tract described as 19.343 acres in Volume 2114, Page 977, Official Records of Nueces County, Texas, and being a tract of land, out of Tract D, as described by "mutual conveyance", dated November 20, 1967, between Nueces County Navigation District #1, Nueces County, Texas, and Guaranty National Bank of Corpus Christi and Jack Pope of Travis County, Texas, et al, and as shown by "Plat of Lands in Brooklyn Subdivision and Nueces Bay Exchange Between Land Owners and District", dated February 13, 1967, as referenced by said "mutual conveyance" and on file with said Navigation District as Drawing Number L-1-137 (3) and formerly part of Brooklyn Addition as shown by Plat in Volume A, Page 30, 31, and 32, Map Records, Nueces County, Texas, which "reverted to acreage" by action of Commissioner's Court of said county as shown by Commissioner's Court Minutes, Volume N, Page 470-471, Nueces County, Texas, and this site being further described by metes and bounds as follows:

BEGINNING AT A POINT in the intersection of the West right-of-way line of U. S. Hwy. 181 and the South boundary line of Block 107, said Brooklyn Addition, at a found disk in a concrete monument for the Southeast corner of this site;

Thence North 57 degrees 52' 00" West along the South boundary line of said Block 107, and Block 125, said Brooklyn Addition, which is the Northeast right-of-way line of St. Charles Street, a distance of 529.02 feet to a set 5/8" iron rod for an interior corner of this site;

Thence South 32 degrees 08' 00" West along the Northwest right-of-way line of Avenue G Street, a distance of 59.92 feet to a found 1/2" iron bar in the Southwest right-of-way line of St. Charles Street for a Southerly corner of this site;

Thence North 57 degrees 52' 00" West along the North boundary line of Block 152 of said Brooklyn Addition and the Southwest right-of-way line of St. Charles Street, a distance of 317.50 feet to a set 5/8" iron rod for the Southwest corner of this site;

Thence North 32 degrees 08' 00" East along the Easterly bulkhead line of Canal A Basin, as shown on said Navigation District Drawing, extended a distance of 160.00 feet to set chiseled cross mark on a concrete bulkhead, which mark is the Southwest corner of a said Canal A Basin and an interior corner of this site;

Thence South 57 degrees 52' 00" East along the Southerly bulkhead line of said Canal A Basin, a distance of 325.00 feet to a point which is the Southeast corner of said Canal A Basin and an interior corner of this site;

Thence North 32 degrees 08' 00" East along the Easterly bulkhead line of said Canal A Basin, a distance of 350.00 feet to a point for the Westerly corner of this site;

Thence North 12 degrees 52' 00" West along the flair between said basin and said canal, a distance of 53.03 feet to a point for a Westerly corner of this site;

Thence North 32 degrees 08' 00" East along the Easterly bulkhead line of said Canal A, a distance of 812.87 feet to a set 5/8" iron rod on the Easterly bulkhead line of said Canal A and the Northwesterly corner of this site;

Thence South 57 degrees 52' 00" East a distance of 560.00 feet to a set 5/8" iron rod in the said West right-of-way line of U. S. Hwy. 181 and the Northeasterly corner of this site;

Thence along said West right-of-way line of U.S. Hwy. 181 South 32 degrees 08' 00" West a distance of 1340.45 feet to the POINT OF BEGINNING containing 18.0125 acres of land, more or less.

This metes and bounds is for survey drawing of sites A and B.
Bearings are based on west R.O.W. line of U. S. Highway 181 being N 32° 08' 00" E.



EXHIBIT A

Meters and Bounds Description Of Site B

Being 18.0125 acres of land, more or less, being all of the tract described as 16.673 acres in Volume 2114, Page 77, Official Records of Nueces County, Texas, and the North 103.88 feet of the 19.343 acre tract described in Volume 2114, Page 77, Official Record of Nueces County, Texas, and being a tract of land, out of Tract D, as described by "mutual conveyance", dated November 20, 1967, between Nueces County Navigation District #1, Nueces County, Texas, and Guaranty National Bank of Corpus Christi and Jack Pope of Travis County, Texas, et al, and as shown by "Plat of Lands in Brooklyn Subdivision and Nueces Bay Exchange Between Land Owners and District", dated February 13, 1967, as referenced by said "mutual conveyance" and on file with said Navigation District as Drawing Number L-1 137 (3) and formerly part of Brooklyn Addition as shown by Plat in Volume A, Page 30, 31, and 32, Map Records, Nueces County, Texas, which "reverted to acreage" by action of Commissioner's Court of said county as shown by Commissioner's Court Minutes, Volume N, Page 470-471, Nueces County, Texas, and this site being further described by notes and bounds as follows:

Starting at a point in the intersection of west right-of-way line of U. S. Hwy. 181 and the South boundary line of Block 107, said Brooklyn Addition thence North 32 degrees 08' 00" East along said west right-of-way of U. S. Hwy. 181, a distance of 1340.45 feet to a set 5/8" iron rod being the POINT OF BEGINNING and the Southeast corner of this site;

Thence North 57 degrees 52' 00" West a distance of 560.00 feet to a set 5/8" iron rod in the Easterly bulkhead line of Canal A, as shown on said Navigation District drawing, and the Southwesterly corner of this site;

Thence North 32 degrees 08' 00" East along said Easterly bulkhead line of said Canal A, a distance of 1401.11 feet to a set 5/8" iron rod for the Northwesterly corner of this site;

Thence South 57 degrees 52' 00" East a distance of 560.00 feet to a found 1" iron pipe in said West right-of-way line of U. S. Hwy. 181 and the Northeast corner of this site;

Thence South 32 degrees 08' 00" West along said right-of-way line of U. S. Hwy. 181, a distance of 1401.11 feet to the POINT OF BEGINNING containing 18.0125 acres of land, more or less.

This meters and bounds is for survey drawing of sites A and B
Bearings based on west R.O.W. line of U. S. Highway 181 being N 32° 08' 00" E.

GF# _____
AMOUNT: _____
PAGES: _____
SAN JACINTO TITLE COMPANY

Any provision herein which restricts the Sale, Rental or use of the described REAL PROPERTY because of Race, Color, Religion, Sex, Handicap, Familial Status or National Origin, is Invalid and unenforceable under FEDERAL LAW, 3/12/89



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SAN JACINTO TITLE COMPANY

Doc# 2001000914
Pages 3
Date: 1/8/01 3:43:57 PM
Filed & Recorded in
Official Records of
NUECES COUNTY
ERNEST M. BRIONES
COUNTY CLERK
Fees \$13.00

STATE OF TEXAS
COUNTY OF NUECES
I hereby certify that this instrument was FILED in File Number
Sequence on the date and at the time stamped herein by me, and
was duly RECORDED, in the Official Public Records of
Nueces County, Texas



COUNTY CLERK
NUECES COUNTY, TEXAS

City of Corpus Christi
P. O. Box 9277
Department of Engineering Service
PROPERTY & LAND ACQUISITION DIV.
Corpus Christi, Texas 78469-9277

Any provision herein which restricts the Sale, Rental or use
of the described REAL PROPERTY because of Race, Color,
Religion, Sex, Handicap, Familial Status or National Origin, is
invalid and unenforceable under FEDERAL LAW, 3/12/89

STATE OF TEXAS
COUNTY OF NUECES

I hereby certify that this instrument was FILED in File Number
Sequence on the date and at the time stamped herein by me, and
was duly RECORDED in the Official Public Records of
Nueces County, Texas



Diana T. Barrera
COUNTY CLERK
NUECES COUNTY, TEXAS

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Official Records of
NUECES COUNTY
DIANA T. BARRERA
COUNTY CLERK
Fees \$19.00



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JUN 25 2013

History Programs Division

June 25, 2013

Section 106: Determination of Adverse Effect with Mitigation &
Coordination and Review of Programmatic Section 4(f) Analysis &
Notification of intent to pursue 4(f) determination

Nueces County, Corpus Christi District
CSJ# 0101-06-095

Harbor Bridge Project

Ms. Linda Henderson
History Programs
Texas Historical Commission
Austin, Texas 78711

Dear Ms. Henderson:

The referenced undertaking will be carried out with federal funding. In accordance with the First Amended Programmatic Agreement Regarding the Implementation of Transportation Undertakings (PA-TU) between the Texas Department of Transportation (TxDOT,) the Federal Highway Administration (FHWA), the Advisory Council for Historic Preservation (ACHP,) and the Texas State Historic Preservation Officer (TSHPO), this letter initiates Section 106 consultation (36 CFR 800.5) concerning the effects the proposed undertaking will have on National Register eligible properties, which include the Harbor Bridge, six associated post 1945 non-truss bridges located at:

- United States Highway (US) 181 at Corpus Christi Ship Channel
- US 181 at Burleson Street
- US 181 Northbound Ramp at US 181
- US 181 Southbound at Belden Street
- US 181 Southbound Off-Ramp at State Spur (SS) 544
- US 181 Northbound at SS 544
- US 181 Northbound On-Ramp at SS 544

and the San Antonio, Uvalde, and Gulf (SAU&G) Railroad Depot (1101 N. Tancanhua Street) located within the project's area of potential effects (APE). We request your concurrence of a determination of adverse effect with mitigation under Section 106 and the formal coordination and review in approving the Section 4(f) evaluation.

Introduction

The Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT) propose to improve United States Highway (US) 181 at the Corpus Christi Ship Channel in the City of Corpus Christi, Nueces County, Texas, by removing and replacing the existing bridge structure. The

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existing bridge is commonly known as the Corpus Christi Harbor Bridge. The removal and replacement of the Corpus Christi Harbor Bridge would also require reconstruction and improvements to associated highways and nearby interchanges, including six additional bridges, in order to provide safe and efficient access to the new Harbor Bridge. The proposed project is captioned as TxDOT Control-Section-Job (CSJ) 0101-06-095.

The existing Harbor Bridge would be replaced by a six-lane divided structure with shoulders, constructed on a new-location alignment. Several alternatives are currently under consideration for the exact alignment of the replacement bridge and its approaches. While the design of the replacement structure has not been determined, cost analyses conducted for the project have assumed that the bridge would be a cable-stayed structure with concrete tower piers, based on the clear span and vertical clearance requirements at the crossing. The cable-stayed design would also provide an opportunity to design a “signature” bridge for the Corpus Christi waterfront and downtown areas.

The proposed action would result in a use of the NRHP-eligible Corpus Christi Harbor Bridge through its removal and replacement, and would result in a use of six additional NRHP-eligible bridges as part of associated highway and interchange reconstruction located within several miles of the new Harbor Bridge.

In accordance with 23 CFR 774, the following Section 4(f) Evaluation provides a discussion recommending that there are no feasible and prudent alternatives to the use of the bridges and the proposed action includes all possible planning to minimize harm to the historic bridges resulting from such use. The FHWA requires that the evaluation document includes a description of the proposed action, a description of the Section 4(f) properties, the purpose and need for the proposed project, an analysis of project alternatives including description of impacts to the Section 4(f) properties, and a summary of measures taken to minimize harm to the properties.

The various project alternatives have the potential to use other Section 4(f) properties in addition to the seven bridges covered in this evaluation. The other Section 4(f) properties include historic properties and parks/recreation areas. Separate Section 4(f) Evaluations are being prepared for the other Section 4(f) properties. The analysis of the impacts of project alternatives to the Harbor Bridge and six nearby bridges are combined in this Individual Section 4(f) Evaluation, as the bridges are functionally interrelated due to their proximity along US 181. The potential impacts of a specific project alternative to the Harbor Bridge are closely linked to potential impacts to the other bridges through the alternative’s physical design and alignment, and indirectly through changes in traffic flow patterns and volumes.

Following preparation of Section 4(f) Evaluations for specific properties, a macro-level Section 4(f) document will be prepared, focusing on “least overall harm” analysis of the project alternatives using information from the Section 4(f) Evaluations and information regarding other environmental, socioeconomic, and design constraints.

Historical Significance Statements

Corpus Christi Harbor Bridge – US 181 at Corpus Christi Ship Channel
(National Bridge Inventory (NBI) Structure No. 16-178-0-0101-06-041)

Physical Description

The Corpus Christi Harbor Bridge carries US 181 over the Corpus Christi Ship Channel. It is a continuous cantilever tied arch steel truss bridge, with a total structure length of 5,819 feet. The bridge’s main span is a 1,240-foot-long cantilever steel truss unit, composed of a 387-foot, 6-inch suspended tied-arch center

Corpus Christi Harbor Bridge
CSJ#0101-06-095

span supported by two 116-foot, 3-inch cantilevered steel truss spans and two 310-foot anchor spans on either side. Major approach spans are two 271-foot simple-span deck truss units. Minor approach spans are 15 welded steel plate girder spans and 37 prestressed concrete girder spans. Main span substructure elements are concrete bent caps and piers supported on pile caps on concrete pilings. Approach span substructure elements are multiple column concrete bent caps and bents on concrete pilings.

The bridge's construction began in 1956 and was completed in 1959. The bridge was designed by the Texas Highway Department's Bridge Division, with the firm of Howard, Needles, Tammen, and Bergendoff as the consulting engineer. The bridge's steel members were fabricated by the U.S. Steel Company and construction was accomplished by several firms under the supervision of the Texas Highway Department. The bridge is currently owned and maintained by TxDOT.

A major rehabilitation of the bridge took place between 1983 and 1987, with strengthening of truss members and full redecking. A subsequent rehabilitation project, completed in 2005, repaired or replaced the following elements: stringer diaphragms, stringer connection angles, stringer expansion bearings, truss lacing, truss bearing clip angles, lateral bracing gusset plates, and numerous rivet connections with bolts. A bridge repainting job in 2010 identified severe rusting, section loss, and deterioration in numerous secondary bridge components, leading to an additional rehabilitation of the bridge. This project was completed in spring 2012, with repairs and replacement of bottom lateral diagonal bracing and gusset plates, sway frame diagonal bracing and gusset plates, and top lateral center gusset plates.

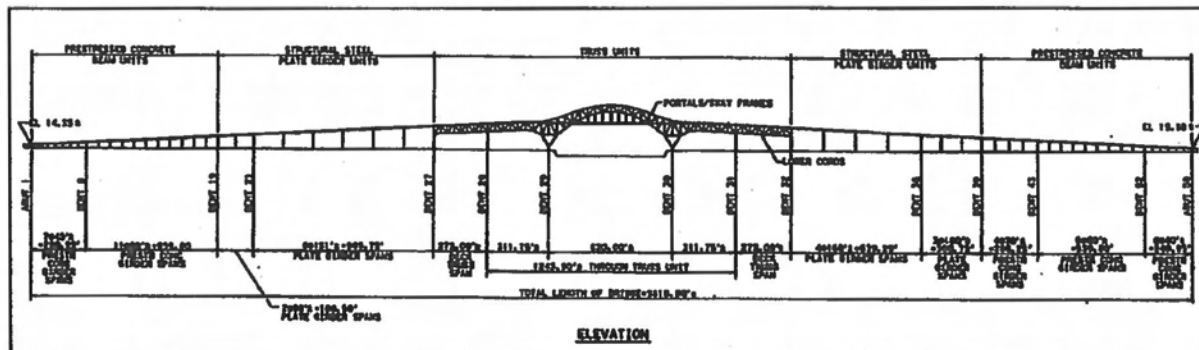


Figure 1. Elevation of Corpus Christi Harbor Bridge, from 2010 rehabilitation project.

Source: Texas Department of Transportation, Bridge Division.

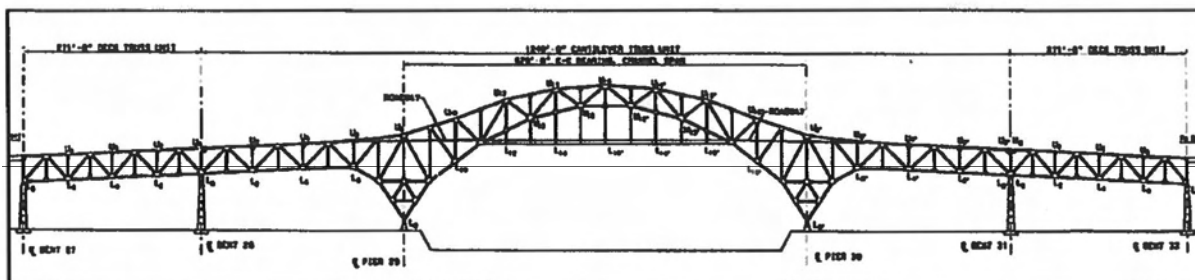


Figure 2. Elevation of Harbor Bridge truss spans, from 2010 rehabilitation project.

Source: Texas Department of Transportation, Bridge Division.

The vertical clearance between the bridge and the Ship Channel water surface is 138 feet. Minimum vertical clearance for vehicular traffic on the bridge is 16 feet, 10 inches. The bridge has a clear roadway width of 36.2 feet in each direction, for a total roadway width of 72.4 feet. The bridge's out-to-out deck width is 82.0 feet. The truss spans of the bridge are not skewed and have no horizontal curve. However, the bridge's south prestressed concrete beam and steel plate girder approach spans are horizontally curved.

The bridge carries six lanes of vehicular traffic, with three lanes of traffic in each direction. A solid concrete barrier separates the northbound and southbound traffic. Each travel lane is 11.7 feet in width. There are no shoulders on the bridge. Three-foot-wide sidewalks are on each side of the bridge and are separated from vehicular traffic by 2.25-foot-high solid concrete barriers. The bridge has non-original metal railings at the outside of the pedestrian sidewalk. The bridge has an 8-inch-thick concrete deck and asphaltic concrete pavement wearing surface, installed in 1987 during a rehabilitation project to replace the original 7-inch-thick lightweight concrete deck. The current deck uses lightweight concrete in the central portions of the main truss to reduce load, and normal-weight concrete for the remainder of the bridge.

The approach roadway on both sides of Harbor Bridge is a six-lane divided facility, with paved shoulders that taper as they approach the bridge structure. The approach roadway is surfaced with asphaltic concrete pavement.

According to the September 2012 bridge inspection, the bridge's current sufficiency rating is 60.0. The sufficiency rating, ranging from 0 to 100, measures a bridge's capability to remain in vehicular service based on a formula incorporating condition rankings, load capacity, roadway and structure geometrics, traffic counts, presence of suitable detour routes, and other bridge inspection factors. The sufficiency rating also serves as a basis for establishing eligibility for replacement or rehabilitation under the Federal Highway Bridge Program.¹ To receive Federal Highway Bridge Program funding for replacement, a bridge must have a sufficiency rating of 50 or below. However, the current sufficiency rating of 60.0 takes into account the recent rehabilitation of the bridge, which was meant to allow for continued vehicular use of the bridge during the lengthy project development and construction process. The Harbor Bridge's sufficiency rating would be expected to decrease over time. For example, the Harbor Bridge had a sufficiency rating of 69.0 following its June 2010 inspection immediately following the rehabilitation, and received a rating of 60.0 following the September 2012 inspection.

A rehabilitation project completed in December 2011 raised the bridge's current operating load rating to HS 26.0. The Operating load rating is defined as the maximum permissible live load that can be placed on the bridge. Photographs of the existing bridge are included in Appendix C.

Significance

The Corpus Christi Harbor Bridge was determined eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance as part of the 1995 Statewide Historic Bridge Inventory of Metal Truss Bridges. The bridge, with its unique combination of a tied-arch center span and cantilevered trusses, is considered the pinnacle of Texas metal truss bridge construction, in terms of technological complexity. The truss design allowed for the exceptional clear span length, structure length, and vertical clearance needed to accommodate ship traffic of the period. When constructed, the bridge was the largest single project of the Texas Highway Department. It is also significant as the first large bridge in

¹ Ficker, Maryellen and Heather Goodson, *Historic Bridge Programmatic Section 4(f) Guidelines and Standards of Uniformity*, Historical Studies Report No. 2009-02, B-4; Texas Department of Transportation, *Bridge Project Development Manual*, December 2012, 2-5.

Corpus Christi Harbor Bridge
CSJ#0101-06-095

Texas with precast prestressed and precast post-tensioned concrete beams, used for the bridge's approach spans. The bridge is considered the most important design work of Texas Highway Department bridge engineer Vigo Miller and was featured in *Time* magazine in 1964 for its exceptional beauty. The bridge's primary character-defining features are its overall cantilevered tied-arch truss design and its prestressed concrete approach spans.

US 181 Bridge at Burleson Street
(NBI Structure No. 16-178-0-0101-06-044)

Physical Description

This bridge, located 0.8 mile north of the Corpus Christi Ship Channel, is a prestressed concrete girder bridge, with a total structure length of 602 feet. The bridge has 10 spans and a curved alignment. Main and approach spans consist of 13 prestressed concrete girders with diaphragms, and the maximum span length is 60 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has solid concrete barriers between northbound and southbound lanes and at the edge of the deck. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1958 and designed by Robert L. Reed of the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The bridge that carries US 181 over Burleson Street is a 10-span prestressed concrete girder bridge constructed in 1958. It is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into American Association of State Highway Officials (AASHTO) specifications for nationwide use. The bridge is also significant as a design of Texas Highway Department design engineer Robert L. Reed, who was recognized as an innovative Texas bridge designer of the period. Reed, who began his career at the Texas Highway Department in 1947, was noted as an early proponent of prestressed concrete. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 bridge at Burleson Street is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Northbound Freeway Connector Bridge over US 181
(NBI Structure No. 16-178-0-0101-06-043)

Physical Description

This bridge, located 0.65 mile north of the Corpus Christi Ship Channel, is a prestressed concrete girder bridge, with a total structure length of 560 feet. The bridge has 10 spans and a curved alignment. Main and approach spans consist of five prestressed concrete girders with diaphragms; the maximum span length is 60 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The

**Corpus Christi Harbor Bridge
CSJ#0101-06-095**

bridge was constructed in 1958 and designed by Robert L. Reed of the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The bridge that carries the US 181 northbound frontage road over the main lanes of US 181 is a 10-span prestressed concrete girder bridge constructed in 1958. It is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. The bridge is also significant as a design of Texas Highway Department design engineer Robert L. Reed, who was recognized as an innovative Texas bridge designer of the period. Reed, who began his career at the Texas Highway Department in 1947, was noted as an early proponent of prestressed concrete. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 northbound frontage road bridge over the main lanes of US 181 is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

**US 181 Southbound Bridge over Belden Street
(NBI Structure No. 16-178-0-0074-06-050)**

Physical Description

This bridge, located 0.1 mile north of IH 37, is a three-span prestressed concrete girder bridge, with a total structure length of 180 feet. Main and approach spans consist of nine prestressed concrete girders with diaphragms; the maximum span length is 60 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard design metal pipe railing. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Southbound bridge at Belden Street in Corpus Christi is a three-span prestressed concrete girder bridge constructed in 1959. The bridge is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 Southbound Bridge at Belden Street is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Southbound Off-Ramp Bridge over SS 544

Corpus Christi Harbor Bridge
CSJ#0101-06-095

(NBI Structure No. 16-178-0-0074-06-171)

Physical Description

This bridge, located 0.35 mile west of Shoreline Drive, is a prestressed concrete girder bridge, with a total structure length of 240 feet. The bridge has four spans and a curved alignment. Main and approach spans consist of eight prestressed concrete girders with diaphragms; the maximum span length is 70 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing along the east edge of the deck and a solid concrete barrier with chain-link safety fence along the west edge of the deck. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by the Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Southbound off-ramp at SS 544 in Corpus Christi is a four-span prestressed concrete girder bridge. Constructed in 1959, the bridge is historically significant as one of the earliest structures associated with the Texas Highway Department's push to construct three- and four-level urban interchanges during the period, identified as an important transportation-related initiative. Although grade-separation structures were widely used across Texas prior to World War II, the first three-level interchange was built in 1953 and the first four-level interchange was built in 1958, coinciding with the development of more complicated roadway networks and heavier traffic volumes. The bridge is also significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. Alterations to the bridge are limited to removal of the original railing. The railing replacement is a relatively minor alteration that relates to integrity of design, materials, and workmanship. The bridge retains its integrity of location, setting, feeling, and association. The alteration results in minimal loss of the qualities that define the bridge's overall historic character and does not diminish its ability to convey historical or engineering significance. The US 181 southbound off-ramp at SS 544 is eligible for listing in the NRHP under Criterion A in the area of Transportation at the state level of significance. It is also eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance.

US 181 Northbound On-Ramp Bridge over SS 544
(NBI Structure No. 16-178-0-0074-06-170)

Physical Description

This bridge, located 0.35 mile west of Shoreline Drive, is a prestressed concrete girder bridge, with a total structure length of 501 feet. The bridge has nine spans and a curved alignment. Main and approach spans consist of six prestressed concrete girders with diaphragms; the maximum span length is 70 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing on its west side and a solid concrete barrier with chain-link safety fence on its east side. An integrated pedestrian bridge/walkway is attached to the east side of the bridge near its north abutment that extends eastward across a northbound on-ramp toward the Nueces County Courthouse. The substructure consists of concrete abutments and multiple UScolumn concrete bents and concrete caps. The bridge was constructed in 1959 and designed by the

Texas Highway Department's Bridge Division. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Northbound on-ramp at SS 544 in Corpus Christi is a nine-span prestressed concrete girder bridge constructed in 1959. The bridge is significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. The bridge does not exhibit physical alterations and it retains its historic integrity of location, design, materials, workmanship, setting, feeling, and association. The US 181 northbound on-ramp over SS 544 is eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance. The bridge is recommended not eligible for the NRHP under Criterion A (Events) at the state level of significance, as it does not have a direct and significant association with an important historic transportation system, program, or policy identified through contextual research.

US 181 Northbound Bridge over SS 544
(NBI Structure No. 16-178-0-0074-06-170)

Physical Description

This bridge, located 0.35 mile west of Shoreline Drive, is a prestressed concrete girder bridge, with a total structure length of 401 feet. The bridge has seven spans and a curved alignment. Main and approach spans consist of eight prestressed concrete girders with diaphragms; the maximum span length is 70 feet. Girders rest on neoprene bearing pads. The bridge has a concrete deck with asphalt overlay. The structure has a Texas Highway Department Type T standard-design metal pipe railing along the west edge of the deck and a concrete barrier with chain-link safety fence along the east edge of the deck. The substructure consists of concrete abutments and multiple column concrete bents and concrete caps. The bridge was constructed in 1959 and designed by James R. Graves and Charlie Covill. Photographs of the existing bridge are included in Appendix C.

Significance

The US 181 Northbound Bridge at SS 544 in Corpus Christi is a seven-span prestressed concrete girder bridge. Constructed in 1959, the bridge is historically significant as one of the earliest structures associated with the Texas Highway Department's push to construct three- and four-level urban interchanges during the period, identified as an important transportation-related initiative. Although grade-separation structures were widely used across Texas prior to World War II, the first three-level interchange was built in 1953 and the first four-level interchange was built in 1958, coinciding with the development of more complicated roadway networks and heavier traffic volumes.

The bridge is also significant as an example of early use (pre-1960) of neoprene pads as bearing plates for superstructure members. The Texas Highway Department's early development and adoption of neoprene bearing pads was a significant innovation of the period. Neoprene pads proved more economical, durable, and easy to maintain compared with previous bearing materials. This successful innovation was later incorporated into AASHTO specifications for nationwide use. This bridge is also significant as an important work of a master engineer, designer, fabricator, or builder. The bridge's superstructure was designed by Texas Highway Department senior design engineer James R. Graves, recognized as an

innovative Texas bridge designer of the period. Graves was particularly noted for his work with early prestressed concrete bridges. He designed the FM 237 at Coleto Creek bridge in 1956, which was the Texas Highway Department's first prestressed, pretensioned concrete beam bridge and the first bridge in the United States to use neoprene bearing pads. Graves also developed the Texas Highway Department's first set of prestressed concrete beam standards in 1956.

Alterations to the bridge are limited to removal of the original railing. The railing replacement is a relatively minor alteration that relates to integrity of design, materials, and workmanship. The bridge retains its integrity of location, setting, feeling, and association. The alteration results in minimal loss of the qualities that define the bridge's overall historic character and does not diminish its ability to convey historical or engineering significance. The US 181 Northbound bridge at SS 544 is eligible for listing in the NRHP under Criterion A in the area of Transportation at the state level of significance. It is also eligible for listing in the NRHP under Criterion C in the area of Engineering at the state level of significance.

Basis for the Proposed Action

The project's need and purpose relates to existing deficiencies of the existing Harbor Bridge, which carries US 181 over the Corpus Christi Ship Channel. However, implementation of rehabilitation or replacement project alternatives would also require alterations to, or replacement of, six additional bridges that are in close proximity to the Harbor Bridge in order to meet design and safety standards. Therefore, this Individual Section 4(f) Evaluation covers all seven bridges, although the need and purpose is focused on the Harbor Bridge.

Project Needs

Two primary needs have been identified for the Corpus Christi Harbor Bridge project:

- (1) Long-term maintenance and operability
- (2) Safety risks from design deficiencies

In addition, the project has two secondary objectives:

- 1) Provide transportation infrastructure to support economic opportunities in the Corpus Christi area and Coastal Bend region; and
- 2) Consider the connectivity of US 181 to the local roadway system and its effects on adjacent neighborhoods.

The primary needs and secondary objectives are discussed below.

Long-Term Maintenance and Operability

The existing Harbor Bridge is a combination of prestressed concrete beam spans, steel plate girder spans, simple deck truss spans, continuous deck truss spans, and suspended tied arch spans. The Harbor Bridge is a fracture-critical structure, meaning the key structural elements supporting the bridge are not themselves supported by additional and redundant elements. This means that if a key support fails, the bridge would be in danger of collapse. This does not mean the bridge is inherently unsafe, only that the bridge design does not include additional structural members to carry loads in the event of a single member's failure.

There are currently at least 280 fracture-critical members on the existing bridge. Fracture-critical members include link pins, deck truss sway frames (including the diagonal members and gusset plates), and floor beams for the deck truss and cantilever truss units. A fracture-critical member is defined by the FHWA's National Bridge Inspection Standards as "as a steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse."²

Based on a special September 2007 Fracture-critical Inspection and a December 2008 Bridge Condition Survey, TxDOT undertook a major rehabilitation of the bridge between 2010 and 2012 to address the following major findings:

- Significant section loss of some gusset plates (metal plates used to connect multiple structural members of a truss), particularly gussets connecting top chords to verticals in the bridge's deck trusses
- Missing or broken rivets and anchor bolts
- Corrosion, pack rust, and section loss in deck sway bracing
- Floorbeam and stringer stiffener section loss
- Sagging lateral bracing under the deck
- Leaking deck joints

Widespread rusting, with pack rust, knife edging, and paint failure prevalent throughout the bridge. The fracture-critical inspection and condition survey did not include the pre-stressed girder or plate-girder approach spans. Later inspections noted severe cracking of pre-stressed concrete beam ends over water. In response to the bridge's deteriorated condition, TxDOT undertook immediate critical repairs to the bridge's steel members in early 2009, with a more extensive rehabilitation between 2010 and 2012. The rehabilitation was designed to provide 15 to 20 years of additional service life while long-term plans were developed for the US 181 at Corpus Christi Ship Channel crossing.

The recent rehabilitation addressed immediate safety concerns. However, the bridge's most recent inspection, conducted in September 2012, notes continuing or reoccurring corrosion issues almost immediately following rehabilitation, underscoring the bridge's ongoing maintenance and operability issues. Specifically, conditions of the bridge's primary components were noted as following:

- Deck – Condition Rating 6 (Satisfactory Condition – limited minor deterioration of structural elements): Minor cracks in deck soffit in most spans; some delamination and spalling with exposed rebar in three spans; moderate to severe fracturing and spalling of concrete median rail.
- Superstructure – Condition Rating 5 (Fair Condition – extensive minor deterioration of structural elements): Main truss members have pitting corrosion losses throughout and at gusset plate connections. Losses are extensive and corrosion is continuing, but recent painting in rehabilitation project has greatly reduced rate of corrosion. Outside and adjacent steel stringers for truss spans have up to 50 percent corrosion loss of bottom flanges, with several areas of continuing active corrosion. Truss floorbeams have areas of active corrosion along top flange deck interface, web stiffeners, and some stringer connections. Paint system is beginning to break down at floorbeam end connections with active corrosion re-initiating. Gusset plates still exhibit significant section

² Defined at 23 CFR Part 650.305.

losses with some perforations. Significant section loss on sway frames, portal frames, and horizontal bracings, with perforations, knife edge corrosion, and saw-tooth section loss. Minor to moderate end spalling of prestressed concrete beams, with moderate delamination observed in one span.

- Substructure – Condition Rating 6 (Satisfactory Condition): Extensive delamination cracking in four bent caps and in concrete columns in two bents. Minor cracks and delaminations in most other bent caps, columns, and backwalls.
- Channel – Condition Rating 8 (Very Good Condition): No comments noted.
- Approaches – Condition Rating 7 (Good Condition – some minor problems): Minor cracks in south approach retaining walls; minor pavement wear.

Today the structure carries higher dead loads (the weight of the bridge itself) and live loads (the weight of vehicular traffic, wind, water and other factors) than the loads for which it was originally designed in 1959. The bridge was originally designed for a standard H20-S16-44 live load, equating to a hypothetical vehicle with a front tractor axle weighing 4 tons, a rear tractor axle weighing 16 tons, and a semitrailer axle weighing 16 tons. The tractor portion alone weighs 20 tons, but the gross vehicle weight is 36 tons. According to original bridge plans, the bridge was designed for a dead load panel load of 107,000 pounds per truss including concrete deck, wearing surface, and railing.

Live loads have increased with increased traffic volumes and greater weight of typical vehicular traffic, particularly for commercial trucks and heavy-load vehicles that use the bridge. The dead load on the structure was increased in 1987, when the original lightweight concrete deck was partially replaced with a normal-weight deck. Structural modifications undertaken in the late 1980s rehabilitation provided additional reinforcement and strengthening, with changes to the truss's structural configuration, addition of thicker gusset plates, and replacement and upgrade of many connections. However, the increased load nonetheless fatigues the members and contributes to the accelerated maintenance needs of the structure. Heavier trucks and greater ADT lead to more fatigue and greater stress range as defined by the number of cycles to failure. The joints and connection members will continue to deteriorate and will ultimately have to be replaced, even if continued maintenance efforts are performed (TxDOT 2012).

Another major factor to consider in maintaining the structural integrity of the Harbor Bridge is corrosion. The steel bridge resides in a saltwater environment that requires frequent routine cleaning and painting to minimize corrosion, as well as periodic bridge rehabilitation. The combination of salt-laden air, year-round windy conditions, and warm air temperatures increases the potential for steel corrosion to occur (TxDOT 2012). The effect that the corrosive saltwater environment has on exposed metal elements results in frequent and costly maintenance that disrupts vehicular and maritime traffic. Table 2 lists structural repair and painting work completed over the last 30 years. It should be noted that painting tasks until the early 1990s were completed by State forces and are not included in this table.

Corpus Christi Harbor Bridge
CSJ#0101-06-095

Construction Letting Date	Work Description	Bid Amount
July 1985	Rehabilitate bridge and north approaches	\$6,243,265.35
May 1987	Rehabilitate and replace causeway and south approaches	\$22,095,389.45
February 1988	Clean, paint, replace rivets and bolts	\$1,968,000.00
November 1992	Clean and paint structure	\$1,980,000.00
November 1994	Paint bridge	\$1,759,000.00
July 2002	Structural repair	\$5,929,504.00
May 2004	Clean and paint bridge	\$7,911,000.00
January 2010	Clean and paint bridge	\$18,383,880.00
January 2010	Structural repair	\$4,781,830.00
	TOTAL COSTS	\$71,051,868.80

Table 2. Harbor Bridge Rehabilitation and Maintenance Costs, 1985-2012.
(Source: Texas Department of Transportation)

Over the past 30 years, maintenance costs have exceeded \$71 million, unadjusted for inflation. A cost analysis, completed in 2012 by HDR, Inc. for TxDOT's Bridge Division, found that extending the service life of the current Harbor Bridge to 2086 would cost an estimated \$279,471,206 in 2012 dollars (or \$401,430,000 using probable 2012 net present value). Periodic major rehabilitation or reconstruction projects will be required to maintain operability beyond the 15 to 20 years of additional service life provided by the recently completed rehabilitation. The September 2012 inspection illustrates the recurring deterioration of structural and secondary members and the bridge's ongoing maintenance needs. Future rehabilitation projects will need to address secondary members, lateral gusset plates, and other members that were not repaired in the recent project.

While phased-array ultrasound testing can be used to evaluate the condition of the tied-arch link pins, this technology is not effective to examine other non-visible members such as multi-layered gusset plates and the top flange of the bridge's floorbeams. X-ray testing of these members would likewise be very difficult and expensive due to the thickness of the truss members, with estimated costs of up to \$20,000 per truss connection point. X-ray testing would also require full closure of the bridge for extended periods due to the high levels of radiation needed to fully penetrate the truss members. Full deck removal would be required to adequately examine and evaluate the condition of the floorbeams, and allow for repair or replacement of deteriorated members. Floorbeam replacement would likely require full closure of the bridge.

The 2012 cost analysis assumed the following maintenance and rehabilitation needs:

- Yearly maintenance – Composed of localized repainting, routine deck maintenance to joints and cracks, localized rivet replacement, and localized rust treatment for pack rust or knife edging.
- Recurring painting on a 15-year life cycle – Composed of water blasting, surface preparation, prime coat, and paint for truss and plate girder spans.
- Rehabilitation on a 15-year life cycle – Would extend service life by improving existing members, with specific work varying depending on structure condition. The 2008-2010 rehabilitation focused on gusset plates. The next projected rehabilitation would likely focus on top flanges of floor beams that experience section loss. Future rehabilitations could focus on bearings and concrete substructure elements. Rehabilitation costs also assume work to the Harbor Bridge's prestressed concrete approach spans.
- Restoration on a 30-year life cycle – Composed of more robust repairs that would likely include replacement of key elements such as bridge deck or main truss ground-level roller bearings. This work could also include railing replacement, plate girder and deck truss repair, and restoration of truss joints.
- Periodic bridge inspection – The continuing deterioration and numerous fracture-critical members result in increased inspection costs. The cost analysis assumed routine and fracture-critical inspections every two years, ultrasonic testing of bridge pins every five years, and baseline inventories every 15 years following rehabilitation/restoration projects.

Even with repairs of this magnitude, the bridge will remain a fracture-critical structure due to its inherent design.

Safety Risks from Design Deficiencies

Numerous geometric deficiencies, as presented below, exist on the current US 181 facility, including the Harbor Bridge. These deficiencies lead to deteriorating traffic conditions and increased accident levels. In general, crash rates on US 181 within the project limits exceed the statewide average for similar facilities (urban, four lanes or more, divided roadway classification). The 2009 crash rate per 100 million vehicle miles traveled for US 181 within the project limits was 130.97 accidents, whereas the statewide average crash rate in 2009 for similar facilities was 114.65, a difference of 14 percent.³ Corpus Christi Police Department statistics from 2009 indicated that the Harbor Bridge was the most dangerous driving location in the city, with 42 collisions reported on the bridge in that year.⁴

³ Coordination Plan, p. 7.

⁴ Rosenberg, Katherine. "Harbor Bridge was city's most dangerous road." Corpus Christi Caller-Times, January 23, 2010. Accessed on www.caller.com, Jan. 19, 2012.

The current US 181 facility, including the Harbor Bridge, does not meet current FHWA and TxDOT roadway and bridge design standards. The FHWA's *Design Standards for Highways* (23 CFR 625) and TxDOT's *Roadway Design Manual* and *Bridge Design Manual* provide guidelines for various elements of roadway and bridge design, including traffic characteristics, shoulder widths, horizontal and vertical alignment, and on- and off-ramp access. Several elements of the current US 181 facility do not meet these standards, as detailed below.

- 1) The existing Harbor Bridge and immediate US 181 approaches do not have shoulders. There are only sporadic partial-width outside shoulders on the bridge's approach roadway, contributing to increased levels of congestion when even minor traffic crashes and breakdowns occur. As stated in the TxDOT *Roadway Design Manual*, "shoulders, in addition to serving as emergency parking areas, lend lateral support to travel lane pavement structure, provide a maneuvering area, increase sight distance of horizontal curve, and give drivers a sense of safe, open roadway."⁵ The lack of shoulders also means the clearance between the travel lanes and the railing on the existing bridge does not meet current standards. The TxDOT *Roadway Design Manual* calls for a median shoulder width of 10 feet and outside shoulder width of 10 feet for a six-lane divided freeway.⁶ The TxDOT *Bridge Project Development Manual* states, "for all new and replacement projects (4R)...all bridges will carry the full usable shoulder width of the approach roadway across the structure. Bridge widths must conform to the requirements in Chapter 3 of the *Roadway Design Manual* in which the design criteria for 4R projects are represented for various roadway functional classifications and traffic volumes."⁷
- 2) The existing US 181 approaches to the Harbor Bridge are on a five percent vertical slope, which exceeds the maximum design grade for a level urban freeway, as defined in the TxDOT *Roadway Design Manual*. The maximum grade for a level urban freeway is 4 percent for design speeds of 55 miles per hour or less, or 3 percent for design speeds of 60 miles per hour or greater.⁸ The combination of the steep vertical grade and the horizontal curvature on both the north and south ends of the existing bridge creates a situation where vehicles can be travelling downhill speeds and entering into sharp "S" curves at speeds faster than the posted 55 miles per hour (mph) speed. This situation is exacerbated by the high percentage of truck traffic (9 percent of total traffic volume) using US 181 at this location, with industrial traffic from the Port of Corpus Christi

⁵ Roadway Design Manual, p. 2-44.

⁶ Roadway Design Manual, p. 3-63 and 3-66.

⁷ Bridge Project Development Manual, p. 3-2.

⁸ Roadway Design Manual, p. 2-31.

vicinity and the highway's role as a regional traffic artery. The TxDOT *Roadway Design Manual* notes that "the effects of rate and length of grade are more pronounced on the operating characteristics of trucks than on passenger cars and thus may introduce undesirable speed differentials between the vehicle types." Based on the existing vertical slope and length of grade, a heavy truck entering the Harbor Bridge at full speed would be expected to have a speed reduction between 25 and 30 mph, far exceeding the 10 mph value above which is typically considered to be an unreasonable reduction of speed (see Figure 3).⁹

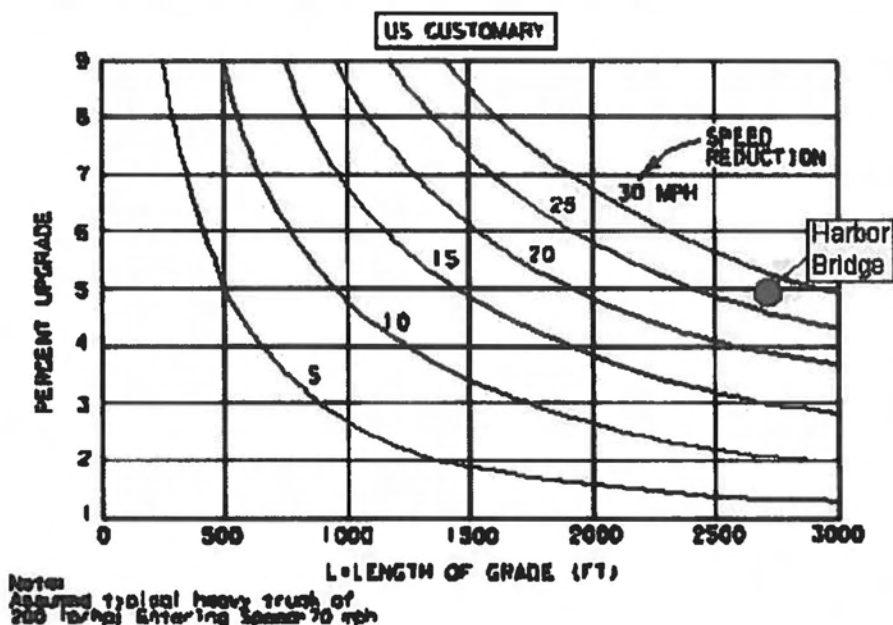


Figure 3. Critical Lengths of Grade for Design,
Source: TxDOT *Roadway Design Manual*, 2010.

- 3) Certain ramp lengths do not provide sufficient acceleration or deceleration distances to meet current design standards for freeway ramps. One example is the US 181 northbound entrance ramp from westbound SS 544/Mesquite Street, located south of the Harbor Bridge near the US 181 and IH 37 interchange. This low-speed entrance ramp has approximately 400 feet acceleration length, an insufficient distance for traffic to safely merge with traffic from an adjacent on-ramp (from North Lower Broadway Street) and the US 181 northbound main lanes. The design standard for this type of ramp is 550 feet. In addition, the ramp's vertical grade and sharp horizontal curvature reduces drivers' ability to effectively merge into the main traffic lane.¹⁰

⁹ Ibid.

¹⁰ TxDOT *Roadway Design Manual*, pp. 3-46 and 3-47.

The US 181 southbound exit ramp to the Port Area, located immediately south of the Harbor Bridge, is another example of a ramp that does not meet current design standards. The ramp distance provides 350 feet of deceleration length prior to a sharp curve to intersect Power Avenue; the ramp has an existing 55 mph US 181 freeway design speed and a 15 mph speed for the entrance curve to Power Avenue. The length of this ramp combined with the sharp horizontal curvature and the steep vertical grade coming down off of the bridge makes it difficult for vehicles, particularly large trucks, to safely decelerate before merging with local traffic on the service road. The existing TxDOT freeway design criteria call for a minimum taper length of 250 feet and a minimum deceleration length of 455 feet. The TxDOT *Roadway Design Manual* notes that “where providing desirable deceleration length is impractical, it is acceptable to allow for a moderate amount of deceleration (10 mph) within the through lanes and to consider the taper as part of the deceleration length.”¹¹ However, the downward vertical grade of the Harbor Bridge approaching this ramp makes deceleration in the through lanes difficult.

Another example of inadequate ramp configuration is the US 181 southbound exit ramp to downtown Corpus Christi, which does not provide sufficient distance for motorists to safely decelerate before reaching the split of the ramp into eastbound Twigg Street and southbound Upper Broadway Street, and the signalized intersection at SS 544/Mesquite Street. The existing ramp provides a deceleration distance of 500 feet to the ramp’s split, while the minimum design standard for deceleration length based on the roadway’s design speed, posted speed, and ramp type is 800 feet.

The current configuration of southbound US 181, located just south of the Harbor Bridge, does not meet current design standards. Approaching downtown Corpus Christi from the north, motorists are presented with a three-decision breakpoint, meaning the three-lane highway offers three separate destinations via US 181 (downtown Corpus Christi, IH 37/SH 286, and Staples Street) from the same point on the highway. The simultaneous three-directional split does not comply with current design criteria, which call for a spacing of a minimum of 1,000 feet between successive exit ramps. In addition, the ramp to downtown Corpus Christi is an undesirable left-hand exit. The *Roadway Design Manual* states that “right-side ramps are markedly superior in their operational characteristics and safety to those that leave or enter on the left. With right-side ramps, merging and diverging maneuvers are accomplished into or from the slower moving right travel lane. Since the majority of ramps are right-side, there is an inherent expectancy by drivers that all ramps will be right-side, and violations of driver expectancy may adversely affect operation

¹¹ Roadway Design Manual, pp. 3-91 and 3-92.

and safety characteristics.”¹² The three-decision breakpoint interchange and short ramp deceleration distances increase the likelihood of erratic movements and accidents, especially for drivers unfamiliar with the Corpus Christi area, an important consideration given the numerous tourist attractions in the immediate vicinity of the interchange.

Another safety-related concern is the designation of both US 181, including the Harbor Bridge, and IH 37 within the project area, as major hurricane evacuation routes (TxDOT 2011). US 181 serves as a primary evacuation route for San Patricio County to the north and an alternate evacuation route to IH 37 for the city of Corpus Christi.¹³ During a storm event IH 37 is used for evacuation until the traffic volumes reach the maximum highway capacity, which includes the use of the shoulder evacuation lane and contraflow lanes (reversing the south bound lanes).¹⁴ Even using the shoulder lanes and contraflow plans, IH 37 cannot handle a major evacuation of Corpus Christi and surrounding areas. Once the traffic volume on IH 37 reaches capacity, traffic is directed to US 181. Therefore, a major evacuation would use both the Harbor Bridge and the Joe Fulton Trade Corridor (Navigation Boulevard, Market Street, and Causeway Boulevard) running from US 181 along the north side of the inner harbor to Carbon Plant Road, which connects to IH 37. The estimated time for evacuation of Nueces County ranges from 14 hours for a Category 1 hurricane to 32 hours for a Category 5 hurricane.¹⁵ Given the design deficiencies outlined above, US 181 carries with it the increased risk of becoming severely congested in the event of an accident or vehicle breakdown during an emergency hurricane evacuation.

Project Purposes

Based on the primary needs listed above, the purpose of the proposed project is to:

- 1) Maximize the long-term highway operability of the US 181 crossing of the Corpus Christi Ship Channel; and
- 2) Correct design deficiencies and bring US 181, including the Harbor Bridge and six additional bridges that serve as integral parts of the highway facility and nearby interchanges, into

¹² Roadway Design Manual, p. 3-90.

¹³ Texas Department of Transportation, *Hurricane Evacuation Routes*. Map dated June 10, 2011. Available at www.dot.state.tx.us/travel/hurricane.

¹⁴ Texas Department of Transportation, *Interstate 37 Hurricane Evacuation Contraflow Route*. May 11, 2010. Available at www.dot.state.tx.us/travel/hurricane; Texas Department of Transportation, *Corpus Christi Hurricane Evacuation Routes 2008*.

¹⁵ Lindell, Michael K., Carla Prater, and Jie Ying Wu, *Hurricane Evacuation Time Estimates for the Texas Gulf Coast*. College Station, Texas: Hazard Reduction and Recovery Center, Texas A&M University, 2002, 6.

compliance with current design standards to improve safety for the travelling public, including during hurricane evacuations.

Additional Project Objectives

In addition to the primary purpose and needs outlined above, TxDOT and the FHWA seek to achieve the following objectives, to some degree, in implementing the proposed action:

- 1) Provide transportation infrastructure to support economic opportunities in the Corpus Christi area and Coastal Bend region; and
- 2) Consider the connectivity of US 181 to the local roadway system and its effects on adjacent neighborhoods.

These objectives are important in the overall context of the proposed project in that they address additional underlying problems, described below, associated with the Harbor Bridge and US 181 in the project area.

Provide Transportation Infrastructure to Support Economic Opportunities in the Area

The Corpus Christi Metropolitan Planning Organization (MPO) has identified the replacement of deficient bridges as a type of project intended to achieve the goals of its 2010-2035 MTP. Specifically, the MTP lists the following goals:

- Reduce congestion by maximizing the capacity and efficiency of the existing major highways and streets.
- Improve the safety of our transportation network through improved efficiency and effectiveness of major street and highway facilities.
- Provide new facilities, improved facilities, and transportation services that expand the economic opportunities in the area.
- Provide new facilities, improved facilities, and transportation services that will support the maintenance of our attainment status and improve air quality.
- Provide new facilities, improved facilities, and transportation services that will increase the value of transportation assets.

The MTP lists the replacement of the Harbor Bridge—prioritized partly on the basis of its use as a hurricane evacuation route—as one of the projects whose implementation would be expected to achieve the above goals. In addition, the MTP describes US 181 as a critical connection for the region's efficient movement of freight and emergency evacuation.

With respect to regional connectivity, the MPO considers US 181 a priority corridor in the future expansion of IH 69 to connect directly to the Port of Corpus Christi, the sixth-largest port in the United States in total tonnage and the primary economic engine for the Texas Coastal Bend.¹⁶ The Port's mission statement is "to serve as a regional economic development catalyst while enhancing and protecting its existing industrial base and simultaneously working to diversify its international maritime cargo business."

In a 2003 Economic Impact Study conducted on the Port's behalf, data were presented showing that the activities at the Port in that year were responsible for 39,905 jobs in Texas and about \$2.2 billion of personal income (Martin Associates 2004). The Corpus Christi MPO's 2010-2035 MTP identifies as an action item "improve ocean liner handling facilities" through development of a long-term plan for replacement of the Harbor Bridge.¹⁷

Consider Connectivity to Local Roadways and Effect on Adjacent Neighborhoods

Access to the City's museum district (including Bayfront Science Park) on the east side of US 181, as well as major traffic generators on the west side (including Whataburger Field professional baseball stadium, the Concrete Street Amphitheater, and the Congressman Solomon P. Ortiz International Center), is not direct and results in congestion on US 181 and local downtown roadways during major events. The combination of US 181 and IH 37, constructed in the late 1950s to early 1960s, modified the local roadway network such that access to uptown and downtown Corpus Christi, particularly from the residential areas north of IH 37, was made longer and less direct. Locally, this has had the effect of creating a barrier between those neighborhoods and the Corpus Christi CBD.

Alternatives Considered

Since the purpose and need for the project is to provide for a safe and efficient crossing, only the no-build and build alternatives were considered. The no-build alternative ignores the basic transportation need. It does not correct the situation that causes the bridge to be considered structurally and functionally deficient. Under the no-build alternative the existing bridge would continue to decline, eventually rendering the facility inoperable. The following build alternatives were investigated:

1. No-build alternatives
 - a. "Do nothing" alternative, which involves no expenditure of federal funding.
 - b. Transportation System Management.
2. Bypass alternatives
 - a. Scenic Bypass or Monument: Leave the Harbor Bridge in place as a scenic bypass or

¹⁶ American Association of Port Authorities, "U.S. Port Rankings by Cargo Volume 2010," <http://aapa.files.cms-plus.com/Statistics/2010%20U.S.%20PORT%20RANKINGS%20BY%20CARGO%20TONNAGE.pdf> (accessed 4 February 2013).

¹⁷ Corpus Christi Metropolitan Planning Organization, *Metropolitan Transportation Plan fiscal years 2010-2035*. Corpus Christi: Corpus Christi Metropolitan Planning Organization, 2009.

monument and build a new structure over the Corpus Christi Ship Channel, without affecting the character-defining features and historic integrity of the seven historic bridges.

b. Upgrade Nearby Parallel Roads: Upgrade nearby roads to handle current and projected traffic volumes and to serve as a hurricane evacuation route.

3. Rehabilitation (avoidance) alternative

a. Continued Full Vehicular Service: Rehabilitate the Harbor Bridge in a way that does not affect the historic integrity of the Harbor Bridge or six nearby historic bridges, while keeping the bridges in full two-way vehicular service.

4. Rehabilitation (use) alternatives

a. Continued Full Vehicular Service: Rehabilitate the Harbor Bridge while affecting the historic integrity of the Harbor Bridge and/or other nearby historic bridges, for continued two-way vehicular traffic.

b. One-Way Pair: Rehabilitate the Harbor Bridge in a way that does not affect the historic integrity of the Harbor Bridge or six nearby historic bridges, as part of a one-way pair.

c. Relocation: Move the Harbor Bridge to a new location for rehabilitation and future use.

5. Replacement alternative: Remove the existing Harbor Bridge and replace with a new structure over the Corpus Christi Ship Channel.

a. Blue Alternative

b. Tunnel Alternative

c. Green Alternative

d. Orange Alternative

e. Red Alternative

f. West Alternative

Efforts to Avoid and Minimize Harm

Planning Efforts

Public Involvement

NEPA-related public involvement

TxDOT has undertaken a major environmental review and public involvement process for the Harbor Bridge project. These efforts are meant to solicit input from interested agencies and the public on a wide range of project alternatives. Since 2009, NEPA-related public involvement efforts have included:

- Pre-scoping letters and conference calls with cooperating and participating agencies (25 Federal, state, tribal, regional, and local agencies). The Texas Historical Commission, as the Texas State Historic Preservation Officer (SHPO), is a participating agency for the project. The Historic Bridge Foundation was also included as an interested party for the project.
- Scoping meetings with cooperating and participating agencies, and the public.

- Development of a Coordination Plan to guide interaction between TxDOT and the FHWA with the public and other agencies.
- Updating of the Harbor Bridge project website and mailing list.
- Reestablishment of the Citizen's Advisory Committee (CAC) with representatives from neighborhoods, local organizations, advocacy groups, and commuters. The CAC met on different occasions between January and October 2012.
- Reestablishment of the Technical Advisory Committee (TAC) with representatives from local municipalities, civic organizations, professional groups, and elected officials. The TAC met on different occasions between January and October 2012.
- TxDOT held nine neighborhood meetings at locations in the project area between September and December 2012.
- Public meeting, combining NEPA and Section 106 public involvement, held at the Solomon Ortiz Center in Corpus Christi on December 4, 2012.

Future NEPA-related public involvement efforts will include:

- Continued updates to project website and mail-outs.
- Additional project scoping and informational meetings, to provide opportunities for review and comment on project alternatives.
- Design Guideline Workshop to solicit community desires for the design of a potential new bridge.
- Additional one-on-one and small-group stakeholder meetings.

Section 106 public involvement

Additional Section 106 public involvement, focused on soliciting participation and input regarding the project's potential effects on historic properties, was initiated by TxDOT in late 2012. Section 106 public involvement efforts to date have included:

- Participation in the December 4, 2012, public meeting for the Harbor Bridge project:
 - Meeting notices on the project website and in local newspaper articles specifically highlighting TxDOT's desire to gain input from the public regarding historic resources.
 - Inclusion of historic resources and Section 4(f) properties in TxDOT's staff presentation.
 - Display map of historic properties in the Area of Potential Effect of the project's build alternatives.
 - Display flowchart of the Section 106 process for meeting attendees.
 - Opportunity to complete a Historic Resources Comment Sheet, available in English and Spanish.
 - Historians from TxDOT, the Texas SHPO, and TxDOT consultant Mead & Hunt, Inc. were present at the meeting to answer questions and solicit input from meeting attendees.

- Inclusion of the final *Historic Resources Survey Report* (HRSR) for the Harbor Bridge Project on the project's website.
- Development of a Section 106 Public Involvement Plan, finalized in February 2013.
- TxDOT staff presentations to the Nueces County Historical Commission (CHC) and the Corpus Christi Landmarks Commission, in their capacity as a Certified Local Government.
- Invitation to organizations, community groups, and owners of directly affected historic properties to participate in the Section 106 process as consulting parties. The following groups have indicated interest in participating as consulting parties:
 - Nueces County Historical Commission
 - City of Corpus Christi Landmarks Commission
 - Historic Bridge Foundation
 - Uptown Neighborhood Initiative
- Article in April 2013 project newsletter regarding historic resources in the project's APE. The newsletter article also encouraged input from the public as Section 106 consulting parties or interested parties.

Future Section 106 public involvement efforts will include:

- Continued input and participation from as Section 106 consulting parties.
- Invitation to representatives of the Nueces CHC and the Corpus Christi Landmarks Commission to participate in the project's CAC, TAC, and/or Design Guideline Workshop.

Design Modifications

TxDOT prepared Historic Bridge Team Reports for the Harbor Bridge and for six adjacent NRHP-eligible concrete bridges to examine possible non-build project alternatives. However, the prudent and feasible alternatives that meet the project's primary needs and secondary objectives would remove the Harbor Bridge and the six adjacent NRHP-eligible concrete bridges. Design modifications or alignment shifts would not result in changes to the removal of the bridges. Design modifications are instead geared towards avoidance or minimization of impacts to other Section 4(f) properties associated with the project. These efforts are further described in the Least Overall Harm Analysis document, under separate cover.

Mitigation for Adverse Effect

Due to its design and monumental scale, the Harbor Bridge cannot feasibly be relocated in a manner that would retain the features and attributes that contribute to the bridge's engineering significance.

Nonetheless, the bridge will be marketed for donation and reuse in accordance with Federal regulations, as specified at 23 CFR 144(n)(4). However, considering the substantial ongoing maintenance and operational costs inherent with the existing bridge, it is considered unlikely that a state agency, locality, or responsible private entity will enter into an agreement to maintain the bridge and its significant features and to assume all legal and financial responsibility for the bridge at a new location. Likewise, the heavy weight,

composite decks, and method of construction of the six adjacent NRHP-eligible concrete bridges makes it realistically infeasible to relocate these bridges. Marketing the six concrete bridges for donation and reuse, as specified at 23 CFR 144(n)(4), will therefore be conducted in a streamlined manner. Copies of the bridge marketing materials are included in Appendix F.

Through Section 106 coordination with the Texas SHPO, TxDOT developed additional measures to mitigate the project's adverse effects to the historic bridges. TxDOT will develop educational materials in tandem with programmatic mitigation efforts for post-World War II bridges currently under development among TxDOT, the Texas SHPO, and the Historic Bridge Foundation. Specifically, the focus for a public education campaign could be focused on the significance of the Harbor Bridge and the six adjacent concrete bridges, such as:

- The Harbor Bridge's cantilevered tied-arch truss design, considered the pinnacle of Texas metal truss bridge construction.
- The early use of prestressed concrete beams as approach spans for the Harbor Bridge.
- The early use of neoprene pads as bearings for prestressed concrete beams, present on several of the NRHP-eligible concrete bridges.
- Early example of a multi-level interchange, relating to the bridges at the US 181/IH 37/SS 544 interchange south of the Harbor Bridge.
- Aspects of the careers of Robert L. Reed and James R. Graves, both identified as significant Texas Highway Department bridge engineers who were influential in the early development and use of prestressed concrete on Texas bridges.

Determination of Effects under Section 106

After applying the criteria of *Adverse Effects* as stipulated in 36 CFR 800.5, I have determined that the proposed action to replace the Corpus Christi Harbor Bridge and the six associated Post-45 bridges will constitute an adverse effect to this National Register eligible property and that the proposed mitigation of the bridges will sufficiently mitigate any and all adverse effects. Please sign in the space provided below indicating your concurrence with this finding of *adverse effect* and proposed mitigation.

No Adverse Effect to Historic Property within the APE & Intent to Pursue De Minimis

The green alternative of the proposed undertaking would necessitate approximately 0.076 acre of additional ROW from the parking lot of the SAU&G Depot (Attachment 1). This approximate half ellipse shape is 150 ft at its base and 25 ft wide at its midpoint. The historic depot would continue to convey its historic significance after the project is complete. Therefore, it has been determined that the proposed action would have no adverse effect to any of the features or characteristics that qualify this property for inclusion in the NRHP

In accordance with CFR 800.5, TxDOT Historians applied the *Criteria of Adverse Effect* and determined that the proposed project poses no adverse effect to the eligible historic property in the APE, as the undertaking will not impair or affect the function of the system and the property will continue to convey its historic significance. The proposed action will not diminish any of the features or characteristics that

qualify the historic property for inclusion in the NRHP. Nor would the proposed action significantly diminish the listed system's location, design, setting, materials, workmanship, feeling or association. For these reasons, the continued easement under the current joint use agreement complies with de minimis guidelines due to the fact that the road and bridge crossings does not affect or diminish the qualities and characteristics that contribute to the significance of the property.

TxDOT also asserts that the proposed undertaking would have no reasonably foreseeable adverse effects that may occur later in time, be farther removed in distance, or be cumulative. Any growth pressures that may or may not exist near the property are already in place and the widening and extension of the road would not increase the likelihood that this property's integrity will be diminished as the vast majority of the property has always been adjacent to a roadway. Furthermore, the widening and extension of the existing roadway would not adversely impact the property's ability to convey its historical significance. The widened and extended roadway therefore would not pose indirect or cumulative adverse effects to the listed property.

For these reasons and as defined in Part 774 of the Section 4(f) Final Rule and Section 6009(a) of SAFETEA-LU, TxDOT Historians intend to recommend to FHWA that the proposed right-of-way acquisition is de minimis due to the fact that the road widening and extension would not affect or diminish the qualities and characteristics that contribute to the historic significance of the property. Furthermore, the bridge replacement poses no foreseeable indirect or cumulative adverse effects to the NRHP-eligible property because the proposed project will not impair the function of the historic irrigation system.

Pursuant to Stipulation VI "Undertakings with Potential to Cause Effects" of the PA-TU, TxDOT Historians determined that the proposed project would have no adverse effect to the historic property and complies with FHWA's de minimis 4(f) guidelines. As a result, TxDOT intends to pursue a de minimis 4(f) determination with FHWA for this project.

Section 4(f) Review

In accordance with 23 CFR 771.135, Section 4(f), attached please find a copy of the draft programmatic Section 4(f) evaluation. As the official with jurisdiction over the Section 4(f) resource, it is provided for your coordination and comment. FHWA will consider this the formal coordination and review in approving the Section 4(f) evaluation.

We look forward to future consultation with your staff and hope to maintain a partnership that will foster effective and responsible solutions for improving transportation, safety and mobility in the state of Texas. Thank you for your cooperation in this federal review process. If you have any questions or comments concerning this project, please call me at (512) 416-2555.

Sincerely,



Carolyn A. Nelson, MS
Architectural Historian
Environmental Affairs Division

Attachments

CONCUR ADVERSE EFFECTS WITH MITIGATION	
NAME: <u><i>Anthony Hernandez</i></u> for Mark Wolfe, State Historic Preservation Officer	DATE: <u>6/27/13</u>

NO COMMENTS TO FINAL DRAFT, SECTION 4(f) EVALUATION	
NAME: <u><i>Anthony Hernandez</i></u> for Mark Wolfe, State Historic Preservation Officer	DATE: <u>6/27/13</u>

CONCUR: NO ADVERSE EFFECT FOR HISTORIC PROPERTIES DETERMINATION OF DE MINIMIS IMPACT UNDER SECTION 4(f) GUIDELINES	
NAME: <u><i>Anthony Hernandez</i></u> for Mark Wolfe, State Historic Preservation Officer	DATE: <u>6/27/13</u>

Bcc: Corpus Christi District
ENV/PM

Christopher Amy
Sonya Hernandez

Corpus Christi Harbor Bridge
CSJ#0101-06-095

ATTACHMENTS

